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ROYAL HORTICULTURAL SOCIETY

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CONTENTS OF VOL. LXII.

	PAGE
CALENDAR, 1937	1
COUNCIL AND OFFICERS	7
THE SOCIETY AND ITS WORK	8
MEETINGS	13
THE SOCIETY'S GARDENS AT WISLEY	19
EXAMINATIONS	26
AWARDS	28
EXHIBITIONS	33
COMMITTEES AND THEIR WORK	36, 40
NAMING OF PLANTS	38
VICTORIA MEDAL OF HONOUR	57
MASTERS LECTURES, 1936: THE POTATO IN ITS EARLY HOME. By Dr. R. N. Salaman, F.R.S.	61, 112, 153, 253
MASTERS LECTURES, 1937: THE PLANT AND ITS WATER SUPPLY.—I and II. By Prof. E. J. Salisbury, D.Sc., F.R.S.	425, 473
CLASSIFICATION OF GARDEN TULIPS: A SUGGESTION. By Sir A. D. Hall, F.R.S., V.M.H.	78
LILIUM BROWNII VAR. COLCHESTERI. By J. Comber, V.M.H.	81
APPLES: AN AMATEUR'S NOTES. By Lt.-Col. G. Speir	83
AWARDS TO PLANTS, 1936-7...87, 130, 173, 221, 267, 321, 370, 412, 454, 510, 541	
BOOK REVIEWS	89, 136, 176, 225, 272, 328, 375, 421, 465, 517, 546
TREWITHEEN, CORNWALL. By George H. Johnstone	93
SCIENCE PROGRESS APPLIED TO HORTICULTURE. By Georges Truffaut, M.C., F.R.H.S.	100
GREVILLEA X SEMPERFLORENS. By B. O. Mulligan, N.D.H.	124
NOTES ON NEW CHRYSANTHEMUMS. By J. Woolman, F.R.H.S.	128
THE AWARD OF GARDEN MERIT. By F. J. Chittenden, F.L.S., V.M.H. 134, 416, 450, 508	
NOTES AND ABSTRACTS	139, 179, 227, 276, 376, 424, 471, 519, 548
THE CARE OF ORNAMENTAL TREES. By A. D. C. Le Sueur, B.Sc., F.S.I. ...	141
GENTIANA DEPRESSA. By C. T. Musgrave, V.M.H.	163
THE PRIMULA ROOT APHIS: A SIMPLE CURE. By Mrs. Gwendolyn Anley	166
COOL GREENHOUSE PLANTS. By J. Coutts, V.M.H.	181
OLD GARDEN ROSES. By the Hon. Robert James	190
ZEPHYRANTHES, PYROLIRION, HABRANTHIUS AND HIPPEASTRUM. By J. R. Sealy, B.Sc.	195
CONTRIBUTIONS FROM THE WISLEY LABORATORY:	
LXXX.—A LEAF-HOPPER ON RHODODENDRON. By G. Fox Wilson, N.D.H., F.L.S.	210
LXXXI.—RUST-RESISTANT STRAINS OF ANTIRRHINUM. By D. E. Green, M.Sc.	214
LXXXII.—ROOT-KNOT EELWORM IN OUTDOOR PLANTS. By G. Fox Wilson, N.D.H., F.L.S.	336
HARDY HYBRID KOREAN CHRYSANTHEMUMS. By Ben Wells, F.L.S.	220
SHRUBS IN AN EAST DORSET GARDEN. By Mrs. A. Desborough	229

	PAGE
OF SOME CANADIAN WILDINGS. By Viscountess Byng of Vimy	239
GESNERIACEAE, HARDY AND HALF-HARDY. By J. W. Besant, F.R.H.S. ...	249
SEMPERVIVUMS. By H. F. R. Miller, F.R.H.S.	277
THE PLACE OF VEGETABLES AND FRUIT IN DIET. By G. E. Friend, M.A., M.R.C.S., L.R.C.P.	286
THE COMMERCIAL FRUIT TRIALS, WISLEY, 1936	296
THE PROBLEM OF THE BLUE HYDRANGEA. By E. M. Chenery.....	304
GARDEN NOTES	326, 419, 513, 544
THE P. D. WILLIAMS MEMORIAL MEDAL	327
FRITILLARIA IN THE BALKANS. By Dr. W. B. Turrill	329
THE FLORA OF CHINA: EARLY INVESTIGATIONS. By F. C. Stern, F.L.S. ...	347
SPECIES OF CAMELLIA IN CULTIVATION. By J. R. Sealy, B.Sc.	352
GARDENS OF EASY MAINTENANCE. By R. S. Lynch	377
HYBRID RHODODENDRONS. By F. C. Puddle, F.R.H.S.	393
HEMEROCALLIS: THE DAY LILY. By G. P. Baker, V.M.H.	399
THE WHITE-BARKED PINE IN N. CHINA. By A. de Carle Sowerby	443
A GARDEN IN THE ANTIPODES. By B. P. Mansfield, N.D.H. (N.Z.)	446
BORDER CARNATIONS AT WISLEY	456
THE MODERN GLADIOLUS. By Major G. Churcher, T.D.	489
CARNATION 'SPECTRUM': ITS STRAINS	494
SOME NEW APPLES. By J. M. S. Potter, N.D.H.	497
RICHARD MILLES'S NEW KITCHEN GARDEN, 1765. By W. Roberts, F.R.H.S.	501
CORNFLOWERS AT WISLEY, 1936	511
DESERT PLANTS. By V. Higgins, M.A.....	521
ANTIRRHINUM RUST. By D. E. Green, M.Sc.	530
SUBURBAN MARKET GARDENING FIFTY YEARS AGO. By G. E. Fussell, F.R.Hist.Soc.	538
EXTRACTS FROM PROCEEDINGS:	
REPORT OF COUNCIL FOR 1936	
ACCOUNTS AND BALANCE SHEET, 1936	xii
NOTICES TO FELLOWS	xxvii, xxxiii, xlv, lxix, lxxxi, ci, cxvii, cxxxvii, cliii, clxix, clxxxv
GENERAL MEETINGS AND COMMITTEE REPORTS ...	xxx, xxxvii, xlix, lxxiv, lxxxvii, cv, cxii, cxliii, clx, clxxiii, clxxxvii
DONATIONS TO WISLEY, 1936	xliii, xcvi, cli
ANNUAL GENERAL MEETING	liv
CHELSEA SHOW REPORT	cix, cxii
ADDITIONS TO LIBRARY	cxix, clii, clxiii, clxxviii
AUTUMN SHOW	clxxxvii
FRUIT AND VEGETABLE SHOW	cxci
GENERAL INDEX	cxci

NOTICE TO BINDER.

Volume LXII has been issued in twelve parts. Parts 2 to 12 each consists of the "Journal" proper, paged with Arabic figures, and "Extracts from the Proceedings," paged with Roman figures. The title and contents should be placed first, and be followed by Part 1 and the following eleven parts of the "Journal" proper, then the eleven parts of "Extracts from the Proceedings."

JOURNAL OF THE ROYAL HORTICULTURAL SOCIETY

Vol. LXII



January 1937

CALENDAR, 1937.

NOTE 1.—Meetings of the Society are held, with very few exceptions, on alternate Tuesdays throughout the year, accompanied on each occasion by a Show of plants, flowers, etc. All meetings, except the Great Spring Show at Chelsea and the Great Autumn Show at the National Hall, Olympia, will be held at the Society's Halls. Fellows' tickets admit to all the Shows mentioned in this Calendar, except that on Tuesday, May 25, for which special tickets will be issued.

The price of admission for Non-Fellows to the ordinary Fortnightly Meetings is :

For two-day Shows, 2s. 6d. on the first day, up to 6 P.M.

1s. od. " " after 6 P.M.

1s. od. on the second day.

For one-day Shows, 2s. 6d. all day.

A fully-licensed Restaurant is available for Fellows and friends.

NOTE 2.—*Fellows are requested to note that in future the Fortnightly Shows will open at 12 noon instead of 1 P.M. The Daffodil Show, the Early Market Produce Show and the Fruit and Vegetable Show will open at 1 P.M. as heretofore.*

On the first day of each two-day Show, the Show will remain open until 7.30 P.M.

NOTE 3.—The following Committees meet on the first day of all Fortnightly Meetings :

Orchid Committee	11.45 A.M.
Fruit and Vegetable Committee	12 NOON
Floral Committee A	12.15 P.M.
Floral Committee B	12.30 P.M.
Joint Rock-Garden Plant Committee	12 NOON
Library Committee	3.30 P.M.
Scientific Committee	4 P.M.

As a rule, plants intended for the inspection of a Committee should be entered with the Secretary of the Committee half an hour before the meeting.

Days and times of other meetings of Committees so far as fixed are given in the Calendar.

January

11	Entries for General and Teachers' Examinations close.	<i>Time.</i>
12	Fortnightly Meeting. Flowers in season.	
	Competition for Cypripediums	12 NOON-5 P.M.
	Lecture (Institute of Landscape Architects) on "The Coronation Planting Scheme"	3.30 P.M.

		Time.
January		
26	Fortnightly Meeting. Flowers in season. Special exhibit from Wisley: Winter Stages of Pests and Diseases of Fruits and other Plants	12 NOON-5 P.M.
	Lecture by Mr. A. D. C. Le Sueur on "The Care of Ornamental Trees"	3.30 P.M.
February		
1	Entries for National Diploma in Horticulture Examinations close.	
9	Fortnightly Meeting. Flowers in season	12 NOON-5 P.M.
	Narcissus and Tulip Committee	11 A.M.
	Lecture by Mr. J. Coutts, V.M.H., on "Plants for the Cool Greenhouse"	3.30 P.M.
13	Entries for Chelsea Show close.	
28	Fortnightly Meeting. Flowers in season	12 NOON- 7.30 P.M.
	Narcissus and Tulip Committee	11 A.M.
	ANNUAL GENERAL MEETING	3 P.M.
24	Second day of Meeting	10 A.M.-5 P.M.
March		
9	General Examination in Horticulture (Seniors and Juniors).	
9	Fortnightly Meeting. Flowers in season.	12 NOON- 7.30 P.M.
	Narcissus and Tulip Committee	11 A.M.
	Joint Rhododendron Committee	11.15 A.M.
	First Masters Memorial Lecture by Dr. E. J. Salisbury, F.R.S., on "The Plant and its Water Supply"	3.30 P.M.
10	Second day of Meeting	10 A.M.-5 P.M.
10	*Demonstration at Wisley (weather per- mitting): Seed Sowing—Indoors and Out- doors	2-4 P.M.
11	*Second day of Demonstration	2-4 P.M.
17	*Demonstration at Wisley (weather per- mitting): Rose Pruning	2-4 P.M.
18	*Second day of Demonstration	2-4 P.M.
20	Teachers' Examination in School and Cottage Gardening.	
23	Fortnightly Meeting. Flowers in season.	12 NOON- 7.30 P.M.
	Competition for Cymbidiums	
	Narcissus and Tulip Committee	11 A.M.
	Joint Rhododendron Committee	11.15 A.M.
	Second Masters Memorial Lecture by Dr. E. J. Salisbury, F.R.S., on "The Plant and its Water Supply"	3.30 P.M.
24	Second day of Meeting	10 A.M.-5 P.M.
April		
3	London Gardens Society. Exhibition of Spring Flowers (Old Hall)	1-7 P.M.
6	Fortnightly Meeting. Flowers in season.	12 NOON- 7.30 P.M.
	Narcissus and Tulip Committee	11 A.M.
	Joint Rhododendron Committee	11.15 A.M.
	Joint Iris Committee	12.45 P.M.
	Lecture by W. B. Turrill, D.Sc., on "Fritil- laries"	3.30 P.M.
7	Second day of Meeting	10 A.M.-5 P.M.
	Lecture by Mr. J. E. Grant White (Institute of Landscape Architects) on "The Planning of the Small Garden"	3.30 P.M.
7	Entries for Early Market Produce Show close.	
7	*Demonstrations at Wisley (weather per- mitting): (1) Spring Spraying of Fruit Trees (2) Shrub Pruning	2-4 P.M.

* Fellows wishing to attend these Demonstrations should inform the Director, R.H.S. Gardens, Wisley, Ripley, Surrey, beforehand, mentioning the day.

		<i>Time.</i>
April		
8	*Second day of Demonstrations	2-4 P.M.
10	Entries for Daffodil Show close.	
15 (Thurs.)	Daffodil Show. (See special schedule.)	1-7.30 P.M.
	Special exhibit from Wisley: Pests and Diseases of Daffodils.	
	Early Market Produce Show (Old Hall).	1-7.30 P.M.
	(See special schedule.)	
	Fruit and Vegetable Committee	12 NOON
	Narcissus and Tulip Committee	12 NOON
	Lecture by Dr. G. E. Friend, on "Vegetables as an Article of Diet"	3.30 P.M.
16	Second day of Shows	10 A.M.-5 P.M.
20	Fortnightly Meeting. Flowers in season. Competition for Odontoglossums.	
	National Auricula & Primula Society's Show	12 NOON-
		7.30 P.M.
	Alpine Garden Society's Show	1-7.30 P.M.
	Narcissus and Tulip Committee	11 A.M.
	Joint Rhododendron Committee	11.15 A.M.
	Joint Iris Committee	12.45 P.M.
	Lecture by Mr. H. F. R. Miller on "Sempervivums"	3.30 P.M.
	Iris Group Meeting and Lecture by Mr. G. P. Baker on "The Cultivation of Iris Species" (Restaurant, Old Hall)	4.30 P.M.
21	Second day of Meeting and Shows	10 A.M.-5 P.M.
24	National Diploma in Horticulture. Written Examination.	
27	British Carnation Society's Show (Old Hall)	1-7.30 P.M.
	Joint Perpetual-Flowering Carnation Committee	12 NOON
28	Second day of Show	10 A.M.-5 P.M.
May		
4	Fortnightly Meeting. Flowers in season	12-7.30 P.M.
	Sewell Medals Competition.	
	Rhododendron Association's Show	1-7.30 P.M.
	Narcissus and Tulip Committee	11 A.M.
	Joint Rhododendron Committee	12.15 P.M.
	Joint Iris Committee	12.45 P.M.
	Lecture by Mr. F. C. Puddle on "Hybrid Rhododendrons"	3.30 P.M.
5	Second day of Meeting and Rhododendron Association's Show	10 A.M.-5 P.M.
25 (Tues.)	CHELSEA SHOW. Royal Hospital Gardens, Chelsea, S.W. 3. (See special schedule.) Admission of Fellows by special invitation only	2 P.M.-8 P.M.
	Joint Carnation Committee	10.30 A.M.
	Joint Iris Committee	10.30 A.M.
	Joint Rock-Garden Plant Committee	10.30 A.M.
	Formal Garden Committee	11 A.M.
	Rock Garden Committee	11 A.M.
	Fruit and Vegetable Committee	11 A.M.
	Joint Rhododendron Committee	11 A.M.
	Narcissus and Tulip Committee	11 A.M.
	Orchid Committee	11.45 A.M.
	Floral Committee A	11.45 A.M.
	Floral Committee B	11.45 A.M.
26 (Wed.)	CHELSEA SHOW. Royal Hospital Gardens, Chelsea, S.W. 3. Private view for holders of Fellows' tickets only	8 A.M.-12 NOON
	Public admitted from noon	12 NOON-8 P.M.
27 (Thurs.)	CHELSEA SHOW. Royal Hospital Gardens, Chelsea, S.W. 3. Private view for holders of Fellows' tickets only	8-10 A.M.
	Public admitted from 10 A.M.	10 A.M.-8 P.M.

* Fellows wishing to attend these Demonstrations should inform the Director, R.H.S. Gardens, Wisley, Ripley, Surrey, beforehand, mentioning the day.

		<i>Time.</i>
May		
28	CHELSEA SHOW. Royal Hospital Gardens,	
(Fri.)	Chelsea, S.W. 3	9 A.M.-5 P.M.
June		
4	Teachers' Advanced Practical Examination at Wisley.	
8	Fortnightly Meeting. Flowers in season Sewell Medal Competition. Competition for Shrubs	12 NOON- 7.30 P.M.
	Iris Society's Show	1-7.30 P.M.
	Joint Rhododendron Committee	11.15 A.M.
	Joint Iris Committee	2.15 P.M.
	Iris Group Meeting and Lecture by Major F. C. Stern on "Irises" (Lecture Room, New Hall)	3.30 P.M.
9	Second day of Meeting and Iris Society's Show Lecture (Institute of Landscape Architects) on "Landscape Architecture in America"	10 A.M.-5 P.M. 3.30 P.M.
14-18	National Diploma in Horticulture. Preliminary Practical Examinations at Wisley.	
22	Fortnightly Meeting. Flowers in season.	12 NOON- 7.30 P.M.
	London and South of England Viola and Pansy Society's Show	12 NOON- 7.30 P.M.
	Cactus and Succulent Society's Show (Old Hall)	1 P.M.-7.30 P.M.
	Joint Rhododendron Committee	11.15 A.M.
	Joint Delphinium Committee	11.15 A.M.
	Joint Iris Committee	12.45 P.M.
	Lecture by Mr. R. S. Lynch on "Gardens of Easy Maintenance"	3.30 P.M.
	Lily Group Discussion on "Nomocharis" (Restaurant, Old Hall)	4.30 P.M.
23	Second day of Meeting and Cactus and Succulent Society's Show (Old Hall)	10 A.M.-5 P.M.
22-25	National Diploma in Horticulture. Final Practical Examinations at Wisley.	
July		
1	British Delphinium Society's Show (New Hall)	1 P.M.-7.30 P.M.
(Thurs.)	Joint Delphinium Committee	12.15 P.M.
3	Lily Group Visit to Gardens. (Particulars from the Secretary.)	
6	Fortnightly Meeting. Lilies and other flowers in season. Competitions for Lilies including the best hybrid Lily	12 NOON- 7.30 P.M.
	Alpine Garden Society's Show (Old Hall)	1 P.M.-7.30 P.M.
	Joint Delphinium Committee	11.15 A.M.
	Joint Border Carnation Committee	11.30 A.M.
	Joint Iris Committee	12.45 P.M.
	Lily Group Discussion "Lilies Exhibited" (Lecture Room, New Hall)	3.30 P.M.
	Lily Group Dinner (Restaurant, New Hall) followed by discussion on "The Decorative Value of Lilies"	7 P.M.
7	Second day of Meeting and Alpine Garden Society's Show	10 A.M.-5 P.M.
9	Civil Service Horticultural Federation's Exhibition (New Hall)	1-7.30 P.M.
10	Joint Delphinium Committee at the British Delphinium Society's Provincial Show at Alderley Edge, Cheshire	11.45 A.M.
(Sat.)	National Carnation and Picotee Society's Diamond Jubilee Show (Old Hall)	1 P.M.-7.30 P.M.
13	Joint Delphinium Committee	11.15 A.M.
	Joint Border Carnation Committee	3 P.M.

		<i>Time.</i>
July		
14	Second Day of National Carnation and Picotee Society's Show	10 A.M.—5 P.M.
16	London Gardens Society. Exhibition of Flowers (New Hall)	2.30 P.M.—9 P.M.
17	Second day of Exhibition	10 A.M.—6.30 P.M.
20	Fortnightly Meeting. Flowers in season. Competition for the best hybrid Lily. Clay Cup for Scented Roses. Competition for Hardy Flowers	12 NOON—7.30 P.M.
	Joint Border Carnation Committee	11.30 A.M.
	Joint Iris Committee	12.45 P.M.
	Lecture by Major G. Churcher on "The Modern Gladiolus"	3.30 P.M.
21	Second day of Meeting	10 A.M.—5 P.M.
21	*Demonstration at Wisley (weather permitting): Summer Pruning of Fruit Trees and Shrubs.	2 P.M.—4 P.M.
22	*Second day of Demonstration	2 P.M.—4 P.M.
27	Joint Border Carnation Committee.	11.30 A.M.
August		
4	Fortnightly Meeting. Flowers in season.	12 NOON—6 P.M.
(Wed.)	Joint Dahlia Committee	11.15 A.M.
5	Entries for Great Autumn Show, National Hall, Olympia, close	
17	Fortnightly Meeting. Flowers in season. Foremarke Cup for Gladioli	12 NOON—6 P.M.
	Joint Dahlia Committee	11.15 A.M.
	Lecture by Mr. D. E. Green, M.Sc., on "Control of Antirrhinum Rust"	3.30 P.M.
17	British Gladiolus Society's Show (Old Hall)	1—7.30 P.M.
18	Second Day of British Gladiolus Society's Show	10 A.M.—5 P.M.
25	*Demonstration at Wisley (weather permitting): Vegetative Propagation of Plants	2—4 P.M.
26	*Second day of Demonstration	2—4 P.M.
31	Fortnightly Meeting. Flowers in season.	12 NOON—6 P.M.
	Joint Dahlia Committee	11.15 P.M.
	Lecture by Mrs. V. Higgins, M.A., on "Desert Plants"	3.30 P.M.
September		
1	Entries for British Floral Art Diploma Examination close.	
4	London Allotments and Gardens Show Society (New Hall)	2.30 P.M.—8 P.M.
7	National Dahlia Society's Show (New Hall)	12 NOON—7.30 P.M.
	Alpine Garden Society's Show (Old Hall)	1 P.M.—7.30 P.M.
	Joint Dahlia Committee	12.15 P.M.
8	Second day of National Dahlia and Alpine Garden Societies' Shows	10 A.M.—5 P.M.
10	National Rose Society's Show (both Halls)	12 NOON—7 P.M.
11	Second day of National Rose Society's Show	11 A.M.—5 P.M.
14	Fortnightly Meeting. Flowers in season. Competition for Cacti and Succulents	12 NOON—6 P.M.
	Sewell Medals Competition.	
	Joint Dahlia Committee	11.15 A.M.
	Lecture by Professor F. E. Weiss, LL.D., F.R.S., F.L.S., on "Variegated Foliage"	3.30 P.M.
27	British Floral Art Diploma. Written Examination.	
29	GREAT AUTUMN SHOW. National Hall, Olympia, W. 14. (See special schedule)	11 A.M.—9.30 P.M.
(Wed.)	Joint Dahlia Committee	11.15 A.M.
	Orchid Committee	11.45 A.M.

* Fellows wishing to attend these Demonstrations should inform the Director, R.H.S. Gardens, Wisley, Ripley, Surrey, Beforehand, mentioning the day.

		<i>Time.</i>
September		
29	Fruit and Vegetable Committee . . .	12 NOON
	Joint Rock-Garden Plant Committee . . .	12 NOON
	Floral Committee A	12.15 P.M.
	Floral Committee B	12.30 P.M.
30 (Thurs.)	GREAT AUTUMN SHOW. National Hall, Olympia, W. 14. Second Day	10 A.M.— 9.30 P.M.
October		
1 (Fri.)	GREAT AUTUMN SHOW. National Hall, Olympia, W. 14. Third day	10 A.M.—5 P.M.
5	Entries for Fruit and Vegetable Show close.	
12	Fortnightly Meeting (New Hall)	12 NOON— 7.30 P.M.
	Fruit and Vegetable Show (Old Hall). (See special schedule.)	1 P.M.— 7.30 P.M.
	Special exhibit from Wisley: Pests and Diseases of Fruit and Vegetables	
	Joint Dahlia Committee	11.15 A.M.
	Fruit and Vegetable Committee	12 NOON
	Lecture by Mr. E. A. Bunyard, F.L.S., on "The History and Cultivation of Peaches and Nectarines"	3.30 P.M.
13 20-21	Second day of Meeting and Show	10 A.M.—4 P.M.
	British Floral Art Diploma. Practical Examination	
26	Fortnightly Meeting. Orchids, Stove and Greenhouse Plants and Berried Shrubs	12 NOON— 7.30 P.M.
	Lecture by Sir Jeremiah Colman, Bt., D.L., V.M.H., on "Orchids"	3.30 P.M.
	Lily Group Discussion on "Hybrid Lilies" (Restaurant, Old Hall)	4.30 P.M.
27	Second day of Meeting	10 A.M.—4 P.M.
November		
9	Fortnightly Meeting. Flowers in season	12 NOON—5 P.M.
	Lectures by Mr. E. A. Bowles, F.L.S., V.M.H., Mr. E. A. Bunyard, F.L.S., and Mr. H. R. Darlington, F.L.S., on "The Gardener's Library"	3.30 P.M.
10	*Demonstration at Wisley (weather per- mitting): Planting Fruit Trees and Roses	2 P.M.—4 P.M.
11	*Second day of Demonstration	2 P.M.—4 P.M.
23	British Carnation Society's Show	1 P.M.—7.30 P.M.
	Joint Perpetual-Flowering Carnation Committee	12 NOON
24	Second day of British Carnation Society's Show	10 A.M.—5 P.M.
30	Fortnightly Meeting. Flowers in season	12 NOON—5 P.M.
	Lecture by Mr. A. N. Rawes on "New Apples"	3.30 P.M.
DECEMBER		
8	*Demonstration at Wisley (weather per- mitting): Pruning Fruit Trees	2 P.M.—4 P.M.
9	*Second day of Demonstration	2 P.M.—4 P.M.
14	Fortnightly Meeting. Flowers in season	12 NOON—5 P.M.
	Institute of Landscape Architects: Presidential Address	3.30 P.M.
1938		
JANUARY		
11	Fortnightly Meeting. Flowers in season	12 NOON—5 P.M.
25	Fortnightly Meeting. Flowers in season	12 NOON—5 P.M.

* Fellows wishing to attend these Demonstrations should inform the Director, R.H.S. Gardens, Wisley, Ripley, Surrey, beforehand, mentioning the day.

PATRONS, 1936.

HIS MOST GRACIOUS MAJESTY KING EDWARD VIII.
 HER MOST GRACIOUS MAJESTY QUEEN MARY.
 HER MAJESTY THE QUEEN OF ROUMANIA.
 THEIR ROYAL HIGHNESSES THE DUKE AND DUCHESS OF YORK.
 H.R.H. THE PRINCESS ROYAL.
 H.R.H. THE DUKE OF CONNAUGHT.

COUNCIL AND OFFICERS, 1936-7.*** PRESIDENT.**

LORD ABERCONWAY, C.B.E., V.M.H.

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† Retire at Annual General Meeting, 1937.

THE SOCIETY AND ITS WORK.

THE purpose of the Society is to encourage and improve the science and practice of horticulture in all its branches. It consists of Fellows, Associates, Honorary Fellows and Associates of Honour, numbering in all over 33,500, and over 700 Horticultural Societies are affiliated to it.

It is governed by a President and Council of fifteen members, of whom one-fifth retire annually in February, when the election of President, Vice-Presidents, Treasurer, and three new members of Council takes place.

The Society was founded at a meeting held on March 7, 1804, at Hatchard's book-shop in Piccadilly—a fact recently commemorated by a bronze plaque placed upon the house. Mr. JOHN WEDGWOOD was in the Chair, and there were also present the Right Hon. CHARLES GREVILLE, the Right Hon. Sir JOSEPH BANKS, P.R.S., WILLIAM TOWNSEND AITON, RICHARD ANTHONY SALISBURY, WILLIAM FORSYTH, and J. DICKSON. These gentlemen formed the nucleus of the Horticultural Society of London, and the avowed duty of that Society was "to collect every information respecting the cultivation of all plants and trees" and "to foster and encourage every branch of horticulture."

The meetings of the Society were first held in the rooms of the Linnean Society, then in Regent Street, and for many years they took place at 21 Regent Street; then for a few months at St. Martin's Place, Trafalgar Square, whence they were transferred under the Presidency of H.R.H. the PRINCE CONSORT to premises of some magnificence at South Kensington, on land now partly occupied by the Imperial Institute.

These premises finally proved too expensive to maintain, and for this and other reasons the Society's offices were removed in 1888 to rooms in Victoria Street, and the meetings took place in the London Scottish Drill Hall, Buckingham Gate, S.W., until 1904, when the Hall and Offices in Vincent Square, built by subscription to commemorate the Society's Centenary, were opened by His Majesty King EDWARD VII. From 1888 under the Presidency of Sir TREVOR LAWRENCE, Bt., and the Secretaryship of the Rev. WILLIAM WILKS, M.A., the story of the Society had been one of progress. This progress continued after the opening of the Hall until the accommodation both for offices and meetings had been outgrown, and in 1928 the New Hall in Greycoat Street was opened by H.R.H. Princess MARY, and the offices in Vincent Square were rearranged and a fine new Library was constructed on the top floor.

The Society was incorporated by Royal Charter, granted on April 7, 1809, and in 1861, on its move to South Kensington, a new Charter was granted to it under the style and title of the Royal Horticultural Society. A supplementary Charter was granted in 1899, and as the Society had continued to increase beyond expectations a new Charter was granted in 1928, coincident with the opening of the New Hall.

FELLOWSHIP OF THE SOCIETY.

Anyone interested in horticulture is eligible for Fellowship and is invited to become a Fellow. Candidates for Fellowship must be nominated on a special form, a copy of which is enclosed, and the nomination form must be signed by a Fellow. Privileges of Fellowship, which include admission to all meetings and to the Society's Garden at Wisley, the use of the Library, a copy of the JOURNAL, etc., are set out on the Nomination Form. The entry fee is at present in abeyance. The annual subscription is from one to four guineas.

ASSOCIATES OF THE SOCIETY.

Candidates for election as Associates must be *bona fide* employed in horticulture, and must be nominated by two Fellows. Associates pay 10s. 6d. per annum.

HONORARY FELLOWS AND ASSOCIATES OF HONOUR
are appointed by the Council.

HONORARY FELLOWS.

- AUCHTER, Prof. E. C., U.S. Department of Agriculture, Bureau of Plant Industry, Washington, D.C., U.S.A.
 BAILEY, Prof. L. H., LL.D., Litt.D., Dean Emeritus, Cornell University, Ithaca, New York, U.S.A.
 BAKER, F. J., A.R.C.S., Fisherswood, Sharnall Street, Hoo, Rochester Kent.
 BARKER, Prof. B. T. P., M.A., University of Bristol Research Station, Long Ashton, Bristol.
 BEAN, W. J., C.V.O., I.S.O., V.M.H., 2 Mortlake Road, Kew, Surrey.
 BLACKMAN, Prof. V. H., M.A., Sc.D., F.R.S., Imperial College of Science, S.W.
 BØRGENSEN, Dr. F. C. E., Botaniske Museum, Gothersgade 130, Copenhagen K, Denmark.
 BOIS, Prof. D. G. J. M., 68 Boulevard Soult, Paris XIII, France.
 CALDER, C. C., B.Sc., B.Sc. (Agr.), F.L.S., Director, Botanical Survey of India, Royal Botanic Garden, Sibpur, nr. Calcutta, India.
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 CARR, Emeritus Prof. the Rev. J. W., M.A., F.L.S., Mapperley Edge, Private Road, Nottingham.
 COLLINGE, Dr. W. E., F.S.A., The Yorkshire Museum, York.
 COMPTON, Prof. R. H., M.A., F.R.S. (S. Af.), Director, National Botanic Gardens of S. Africa, Kirstenbosch, Newlands, Cape Town, S. Africa.
 CORREVON, Dr. H., Jardin d'Acclimatation, Geneva, Switzerland.
 COTTON, A. D., O.B.E., F.L.S., The Herbarium, Royal Botanic Gardens, Kew, Surrey.
 DE WILDEMAN, E., 122 rue des Confédérés, Brussels, Belgium.
 DIELS, Prof. Dr. L., Director, Botanical Gardens, Berlin-Dahlem, Germany.
 EBBLEWHITE, E. A., LL.D., J.P., F.S.A., 5 Essex Court, E.C. 4.
 FEDTSCHENKO, Prof. BORIS, Jardin Botanique Principal, Leningrad, U.S.S.R.
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 GENTIL, LOUIS, 35 Avenue de l'Arbalète, Boitsfort, Belgium.
 GIBAUT, GEORGES, 84 rue de Grenelle, Paris, France.
 GUSSOW, H. T., LL.D., F.L.S., F.R.S. (Can.), Dominion Botanist, Central Experimental Farm, Ottawa, Canada.

10 JOURNAL OF THE ROYAL HORTICULTURAL SOCIETY.

- HALL, Rev. J. BERNARD, M.A., Preston Rectory, Lavenham, Suffolk.
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HANDEL-MAZZETTI, Dr. H., Custos an der Botanischen, Abteilung des Naturhistorischen Museum, Vienna, Austria.
HENNESEY, EUGENE J., B.A., B.Sc., High Mead, Kanes Hill, West End, Southampton.
HOOG, J. M. C., 86 Koninginneweg, Haarlem, Holland.
HOYT, Mrs. A. SHERMAN, Hillcrest, Buena Vista Av., S. Pasadena, California.
IZQUIERDO, SALVADOR, Moneda 778, Santiago, Chile.
KRELAGE, ERNST H., 6 Stolbergstraat, Haarlem, Holland.
KRICHAUFF, The Hon. FREDERICK, Agricultural Bureau, Adelaide, S. Australia.
LEMPERG, Dr. F., Hatzendorf, Steiermark, Austria.
LOCKIE, GEORGE, Botanic Gardens, King William's Town, S. Africa.
MERRILL, Dr. E. D., F.M.L.S., Gray Herbarium, Cambridge, Mass., U.S.A.
MOORE, Sir FREDERICK W., M.A., F.L.S., V.M.H., Rathfarnham, Co. Dublin.
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POLE-EVANS, Dr. I. B., C.M.G., M.A., F.L.S., Irene, Transvaal, S. Africa.
POTTER, Rev. M. C., M.A., Sc.D., F.L.S., Corley Croft, New Milton, Hants.
PRAIN, Lt.-Col. Sir David, C.M.G., C.I.E., LL.D., F.R.S., F.L.S., V.M.H., The Well Farm, Warlingham, Surrey.
RAMSBOTTOM, J., O.B.E., M.A., F.L.S., British Museum (Natural History), Cromwell Road, S.W. 7.
REHDER, A., A.M., Curator of the Herbarium, Arnold Arboretum, Harvard University, Jamaica Plain, Mass., U.S.A.
RENDLE, A. B., M.A., D.Sc., F.R.S., F.L.S., V.M.H., Talland, The Mount, Fetcham Park, Leatherhead.
SALMON, Prof. ERNEST S., F.L.S., South-Eastern Agricultural College, Wye, nr. Ashford, Kent.
SCHNEIDER, Dr. C. K., Bolivarallee 9, Berlin-Charlottenburg 9, Germany.
SIRKS, Dr. M. J., Wageningen, Holland.
SKOTTSBERG, Prof. C. J. F., Göteborgs Botaniska Trädgård, Sweden.
SMITH, G. W., O.B.E., F.L.S., Strathclyde, Barbados, West Indies.
STOUT, Dr. A. B., Director of the Laboratories, New York Botanical Garden, Bronx Park (Fordham Branch P.O.), New York, N.Y., U.S.A.
TANAKA, Prof. TYOZABURO, Taihoku Imperial University, Taiwan, Japan.
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VAN SLOGTEREN, Prof. Dr. EGBERTUS, Laboratorium voor Bloembollenonderzoek, Lisse, Holland.
VANWIJNGAERDEN, A., Directeur de l'Ecole d'Horticulture de l'Etat, Vilvorde, Belgium.
VAVILOV, Prof. Dr. N. I., Director of the Institute of Plant Industry, 44 Rue Herzen, Leningrad, U.S.S.R.
VOELCKER, J. A., C.I.E., M.A., Ph.D., F.I.C., F.L.S., 1 Tudor Street, E.C. 4.
VOLLBRACHT, ADOLF, Austrian Hort. Society, 12 Parkring, Vienna, Austria.
WALLACE, R. HEDGER, Perzan, Wood End Road, Wednesfield, Staffs.
WALLER, ERNEST, Emsallah, Tangier, Morocco.
WORSDELL, W. CROSFIELD, 11 Westbourne House, Twickenham, Middlesex.
WORSLEY, A., J.P., The Cliff, 3 Bath Road, Ventnor, I. of W.
ZAWODNY, M. le Docteur JOSEPH, 105 Moldantein, Czechoslovakia.

ASSOCIATES OF HONOUR.

Established in 1930 and conferred on Persons of British nationality who have rendered distinguished service to Horticulture in the course of their employment. The number of Associates of Honour may not exceed 100 at any one time.

- 1933 ALEXANDER, JOHN, Niddrie Gardens, Craigmillar, near Edinburgh.
 1933 ALLAN, DONALD, c/o Dobbie's Seed Farms, Marks Tey, Essex.
 1931 ANDERSON, T. W., c/o Laxton Bros., 63 High Street, Bedford.
 1931 ANDREWS, A., 10 St. George's Avenue, Peverel, Plymouth.
 1930 ASHMORE, A. J., 10 Desenfans Road, Dulwich, S.E. 21.
 1936 BAILEY, WM. H., The Gardens, Crooksbury House, Farnham, Surrey.
 1932 BAKER, W. G., Botanic Garden, Oxford.
 1930 BANKS, G. H., Glasgow Botanic Gardens, Glasgow.
 1934 BARRON, F. S. Westholme, Colville Road, Wisbech, Cambs.
 1933 BEATTY, T., 175 Myland Road, Colchester.
 1930 BENBOW, J., The Manor House, Kingston Park, Dorchester.
 1930 BENNETT, W., 7 Woodcrest Road, Darlington, Durham.
 1931 BESANT, J. W., Department of Agriculture, Botanic Gardens, Glasnevin, Dublin, N.W. 3.
 1931 BLAIR, C., The Gardens, Preston House, Linlithgow.
 1930 BLISS, D., V.M.H., Parks Department, 4 Mount Street, Swansea, Glam.
 1936 BOLAS, T. WM., The Gardens, Mount Stewart, Newtownards, Co. Down.
 1934 BRAGGINS, S. W. MACLEOD, Poggio Ponente, P. Vallecrosia, Italy.
 1931 BREW, E. U., c/o Charlesworth & Co., Ltd., Orchid Growers, Haywards Heath, Sussex.
 1930 BROWN, T. W., Ministry of Agriculture, Horticultural Section, Giza (Mudiriya), Egypt.
 1931 BULLOCK, A., 158 Northwood Way, Northwood Hills, Middlesex.
 1934 BURTON, Miss M. E., Glen View, Lasswade, Midlothian.
 1932 CHISHOLM, J. S., Edinburgh & East of Scotland College of Agriculture, 13 George Square, Edinburgh.
 1933 CHRISTIE, J. S., 424 Lordship Lane, E. Dulwich, S.E. 22.
 1933 CLARK, W. B., Superintendent, Links and Parks Department, Town House, Aberdeen.
 1931 COATES, A. W., The Gardens, Wakehurst Place, Ardingly, Sussex.
 1930 COMBER, J., V.M.H., The Gardens, Nymans, Handcross, Sussex.
 1931 COOK, C. H., The Royal Gardens, Sandringham, King's Lynn, Norfolk.
 1930 COOK, T. H., Bewdley, South Wootton, King's Lynn, Norfolk.
 1930 COOPER, E. W., 2 North Riding, Bricket Wood, St. Albans, Herts.
 1930 COUTTS, J., V.M.H., 43 The Green, Kew, Surrey.
 1932 CRAVEN, WILLIAM, Mowbray House, Radipole Park Drive, Weymouth, Dorset.
 1931 DAVIDSON, J. J., The Gardens, Arden Craig, Rothesay, Bute.
 1932 GIBSON, E., 19 Helix Road, Brixton Hill, S.W. 2.
 1930 GILES, W. F., 38 Redlands Road, Reading, Berks.
 1930 GUTTRIDGE, J. J., Burwood, Woodlands Road, Aigburth, Liverpool, 17.
 1932 HALES, WM., A.L.S., V.M.H., Chelsea Physic Gardens, Chelsea, S.W. 3.
 1934 HARRISON, A. T., The Gardens, Training Centre, Jordanhill, Glasgow, W. 3.
 1930 HARROW, G., Gracefield, 27 Tudor Road, Kingston Hill.
 1930 HILL, JOHN, The Gardens, Duntreath Castle, Blanefield, Stirlingshire.
 1930 HOLTON, R. H., c/o J. Cheal & Sons, Ltd., The Nurseries, Crawley, Sussex.
 1930 HONESS, W. H., Walhampton Gardens, Lymington, Hants.
 1932 HORWOOD, FREDERICK, M.M., Hillside, Picts Hill, Langport, Somerset.
 1931 HOSKING, A., 47 Poltimore Road, Guildford, Surrey.
 1930 ISBELL, W., 16 St. Mark's Road, Bush Hill Park, Enfield.
 1934 JAMES, E. R., Iwerne, London Road, Reading, Berks.
 1931 JEARY, T. J. P., c/o George Monro, Ltd., 41 King Street, Covent Garden, W.C. 2.
 1930 JENKINS, W. A., Faceby, Stokesley, Yorks.
 1930 JOHNSON, W. E., 3 St. John's Street, Newton Abbot, Devon.
 1930 JORDAN, F., V.M.H., Yewdene, Edenbridge, Kent.
 1930 KETTLETY, A., c/o Blackmore & Langdon, Twerton Hill Nursery, Bath.
 1931 LANE, G. T., 83 Ennerdale Road, Richmond, Surrey.
 1930 LOGAN, W., St. Blaise, 8 Holtwhite Avenue, Enfield, Middlesex.
 1931 LONG, E. P., Drax House, Orcheston St. George, Wilts.
 1932 LONG, F. R., Superintendent of Public Parks, St. George's Park, Port Elizabeth, Cape Province, Africa.
 1931 McDONALD, F. W., 172 London Road, Reading.
 1930 MACFIE, JAMES B., c/o Dobbie & Co., Ltd., Edinburgh.
 1932 MCINNES, DONALD, The Gardens, Glamis Castle, Glamis, Angus, Scotland.

- 1931 MCINTOSH, D. F., c/o R. H. Bath, Ltd., Floral Farms, Wisbech, Cambs.
 1930 McLAREN, J., Superintendent, Golden Gate Park, San Francisco, California.
 1931 MACRAE, A., Superintendent, Parks and Cemeteries Department, 93 Commercial Street, Dundee.
 1931 MAITLAND, T. D., M.B.E., 20 Craiglockhart Terrace, Edinburgh.
 1932 MANN, PHILIP, 1 Stoke Road, Aylesbury, Bucks.
 1932 MARKHAM, E., The Moat, Gravetye, East Grinstead, Sussex.
 1932 MARKHAM, H., The Gardens, Wrotham Park, Barnet, Herts.
 1930 MARLOW, W. J., 205 Richmond Road, Kingston-on-Thames, Surrey.
 1931 MATHEWS, J. W., National Botanic Gardens, Kirstenbosch, Claremont, S. Africa.
 1930 METCALFE, A. W., Rozell, Hatfield Road, St. Albans, Herts.
 1935 MOORE, H. J., Box 61, Islington, Ontario, Canada.
 1930 MUDGE, E. C., c/o Barr & Sons, 11/13 King Street, Covent Garden, W.C.
 1933 MUSTOE, W. R., O.B.E., 70 Stag Leys, Ashted, Surrey.
 1930 NEAL, E., The Gardens, Tilgate, Crawley, Sussex.
 1934 NOBBS, G., Osborne House Gardens, East Cowes, I. of W.
 1930 OLIVER, W., c/o John Forbes, Ltd., Buccleuch Nurseries, Hawick.
 1930 PAGE, W. H., The Gardens, Chardwar, Bourton-on-the-Water, Glos.
 1933 PERFECT, B. F., Gattin Park Gardens, Reigate, Surrey.
 1936 PRESTON, F. G., University Botanic Garden, Cambridge.
 1931 PRITCHARD, W. J., Marsden Avenue, New Queniborough, nr. Leicester.
 1930 PUDDLE, F. C., The Gardens, Bodnant, Tal-y-Cafn, Denbighshire.
 1933 RADLEY, S., c/o R. Veitch & Son, Ltd., The Royal Nurseries, Alphonington, Exeter.
 1934 RAFFILL, C. P., 193 Kew Road, Kew, Surrey.
 1930 ROGERS, J., Brooklyn, Villiers Road, Woodthorpe, Nottingham.
 1930 SCOTT, J. W., c/o Lowe & Shawyer, Ltd., The Nurseries, Eaton Bray, Dunstable.
 1930 SHILL, J. E., Orchid Department, Dell Park, Englefield Green, Surrey.
 1930 SILLITOE, F. S., M.B.E., 31 Priory Road, Kew, Surrey.
 1933 SMITH, SAMUEL, The Gardens, Penjerrick, Falmouth, Cornwall.
 1930 STREET, C., The Gardens, Floors Castle, Kelso, Roxburghshire.
 1930 TANNOCK, D., Superintendent, Reserves Department, Botanic Gardens, Dunedin, New Zealand.
 1932 TAYLOR, GEORGE, The Gardens, Bulstrode, Gerrard's Cross, Bucks.
 1932 TAYLOR, GEORGE M., Links Cottage, Longniddry, East Lothian.
 1932 TROUGHTON, FRANCIS, 1 Vernon Park, St. John's, Worcester.
 1933 TUCKER, S. W., The Gardens, Longford Castle, Salisbury, Wilts.
 1935 TUSTIN, F., The Gardens, Abbotswood, Stow-on-the-Wold, Glos.
 1934 USHER, A. E., Ranston Gardens, Blandford, Dorset.
 1936 WADDS, A. B., Englefield Gardens, Reading.
 1930 WEBSTER, C., The Gardens, Gordon Castle, Fochabers, Elginshire.
 1930 WESTON, J. G., Chatsworth Gardens, Bakewell, Derbyshire.
 1931 WILLIAMS, R. O., Beit Cattin, Katamon Road, Jerusalem, Palestine.
 1932 WOOD, C. F., Park Lodge, Stangham Park, Handcross, Sussex.
 1930 WOODWARD, J. G., The Gardens, Barham Court, Teston, Maidstone.
 1935 WORT, J., 4 Lidyard Road, Archway Road, N. 19.

FORMER ASSOCIATES OF HONOUR.

- | | | |
|--------------------------------|-----------------------------------|----------------------------------|
| 1930 BEDFORD, A. (d. 1934). | 1931 HOARE, J. (d. 1932). | 1931 MACDONALD, J. V. (d. 1936). |
| 1931 BLAIR, P. C. (d. 1936). | 1930 HOWE, W. (d. 1930). | 1931 PATEMAN, T. (d. 1933). |
| 1930 BROWN, J. (d. 1930). | 1933 INGRAM, G. J. (d. 1935). | 1930 STEWART, L. B. (d. 1934). |
| 1930 BUSS, F. (d. 1930). | 1930 IRVING, W. (d. 1934). | 1931 TAYLOR, T. W. (d. 1932). |
| 1931 CAMERON, J. (d. 1935). | 1931 JONES, J., O.B.E. (d. 1934). | 1932 VASEY, A. E. (d. 1934). |
| 1930 CARPENTER, G. (d. 1935). | 1932 JONES, J. (d. 1933). | 1930 WAKELY, C. (d. 1932). |
| 1934 GINGELL, W. B. (d. 1936). | | |

AFFILIATED SOCIETIES.

Any horticultural, allotment, or cottage garden Society may become affiliated to the Royal Horticultural Society on payment of a subscription of one or two guineas. The privileges, among others, include two transferable tickets of admission to all the meetings in the Society's Halls announced in the Calendar and to the Society's Garden at Wisley, a number of special tickets for the Great Spring and Autumn Shows in accordance with the affiliation subscription, two copies of the

Society's JOURNAL as issued, and a copy of the Society's Rules for Judging, the right to purchase at a discount many of the Society's publications, and at cost price the Affiliated Society's Medal and Medal Cards, to apply for a grant of a Banksian Medal and Card, etc., etc.

Fellows are asked to bring to the notice of local Secretaries the great privileges conferred by affiliation ; full particulars, together with an application form, can be obtained by applying to the Secretary.

MEETINGS. (See Calendar, pp. 1-6.)

A meeting and exhibition are held usually at fortnightly intervals in the New Hall in Greycoat Street, Westminster, and sometimes the Old Hall in Vincent Square is occupied as well.

There are also special meetings for the Daffodil Show, the Early Market Produce Show, the Great Spring Show at Chelsea, the Great Autumn Show, National Hall, Olympia, and the Fruit and Vegetable Show.

The times during which the Shows are open are shown in the Calendar, and Fellows are particularly asked to note that, in order to meet the convenience of those who cannot attend the meetings during ordinary working hours, the two-day meetings are open on the first day until 7.30 P.M.

At these meetings there are exhibitions of Flowers, Fruits and Vegetables, to which all horticulturists are invited to contribute. The arrangements for showing are briefly set out in the section dealing with the Committees and their work (pp. 33-56), and at all these meetings Committees appointed for the purpose make recommendations for Awards (p. 28) to the plants before them.

Sundries of a horticultural nature are exhibited at the meetings in December and January, and if space permits on November 30, and at the Great Spring Show ; Pictures of Plants, Flowers, and Gardens and Models and Plans of Gardens are also admitted to the Shows in November, December, January and February.

LECTURES.

Lectures on subjects of horticultural interest are given at the fortnightly meetings at 3.30 P.M., as indicated in the Calendar, and in addition discussions have been arranged for those especially interested in Lilies and their allies and in Irises (see below).

LILY GROUP.

The Lily Group consists of Fellows and Associates of the Royal Horticultural Society who are especially interested in Lilies, *Nomocharis* and *Fritillaries*. Its object is to provide Members with facilities for meeting to exchange views upon these plants. Membership is open to all Fellows and Associates without additional subscription. Those who wish to join should apply in writing to the Secretary, who notifies Members by post of all meetings. Upon the recommendation

of the Lily Committee the Council has arranged five meetings for 1937. The dates and subjects to be discussed will be found in the Calendar. Each discussion will be introduced by one or more speakers who have made a special study of the subject, and thereafter the discussion will be open. All Members are cordially invited to take part, and to bring plants, cut blooms, photographs or lantern slides bearing upon the subject under discussion. Inquiries from beginners will be welcomed.

IRIS GROUP.

The Iris Group has been formed in co-operation with the Iris Society on similar lines to the Lily Group. The Membership is likewise open to all Fellows and Associates without additional subscription, application only to the Secretaries of either Society being necessary. Group members will be notified by post of the meetings. There will be two meetings in 1937. The dates and subjects to be discussed will be found in the Calendar.

THE LINDLEY LIBRARY.

Trustees : The Society acting by its Council.

Keeper : F. J. CHITTENDEN, F.L.S., V.M.H.

Asst. Librarian : W. T. STEARN, F.L.S.

This Library now consists of more than 15,000 volumes and pamphlets, the latter being very important, and is registered as an " Outlier Library " of the Central Library for Students (see regulation 11).

The nucleus of the Library is the fine collection of books and pamphlets belonging to the late Dr. LINDLEY, so long and so honourably associated with the Society. Large additions have been received and are constantly being made by donations and by purchases by the Society. During 1936 a very important addition has been made of the books bequeathed by the late Mr. REGINALD CORY.

The original fittings and furnishings of the old Library, the generous gift of the late Sir HENRY SCHRÖDER, have been carefully removed and re-erected in the new Library on the third floor of the Offices of the Society in Vincent Square, and the cost of equipment of the stack room was presented by the Trustees of the Carnegie United Kingdom Trust Fund.

The Council confidently asks the assistance of the Fellows and of the general public in its endeavours to supplement the Library. Donations of money, and of horticultural and botanical books and horticultural trade catalogues are earnestly solicited, and may be sent to the Secretary, R.H.S., Vincent Square, S.W. 1.

LIBRARY REGULATIONS.

1. The Library is open daily (Sundays and holidays excepted) from 10 A.M. to 5 P.M. (Saturdays 10 A.M. to 1 P.M.). On two-day Shows at Westminster, it will be open until 6 o'clock on the first day of the Show.

2. The right of closing the Library at any time for purposes of re-arrangement, cleaning, etc., is reserved. It will be closed annually for a fortnight after the second fortnightly meeting of the Society in July, in order that the books may be cleaned and the stock inspected. For this purpose it is absolutely necessary that all books borrowed be returned on or before July 21. During the two weeks which follow Fellows will be able to consult books but not to borrow them.

3. Fellows of the Society have access to the Library at all times when it is open.

4. Gardeners and others, not Fellows or Officers of the Society, must make application to the Secretary for permission to use the Library, and must enter their names and addresses in a book provided for that purpose.

5. Anyone requiring the loan of a book to be taken from the Library must make written application to the Secretary, and loans will be granted on the following conditions, viz. :—

(a) That the borrower be personally known to one or more of the Officers of the Society, or produce satisfactory references.

(b) That the borrower sign the receipt for the volumes in a book provided for the purpose, before removing them from the premises, or if unable to attend, acknowledge the receipt by post ; and undertake to restore the books in good condition and to comply with the regulations.

(c) That not more than three volumes be lent to one person at one time.

(d) That borrowers through the post pay the postage both ways.

6. A certain discretion will be used as to what books shall be lent, but rare books which it would be difficult to replace, periodicals, expensive illustrated works and works of reference which are likely to be in frequent requisition within the Library itself may not be removed from the premises.

7. No books may be sent to Fellows resident abroad.

8. All books borrowed must be returned to the Library in good condition within one calendar month from the date of issue, and if sent by post must be properly protected and packed, but an extension of time may be granted on application.

9. The Secretary is empowered to demand of the borrowers such books as are retained beyond the prescribed time, and to take such steps as may be necessary to secure the prompt return of the same.

10. The loss of any book or any damage must be made good by the borrower.

11. Fellows requiring books on loan from the " Outlier " Libraries should make written application either to the Secretary of the Society or to the National Central Library for Students, Malet Street, London, W.C. 1.

12. The Trustees reserve the right of repealing or altering any of these regulations from time to time as may be required.

LIBRARY CATALOGUE.

The catalogue of the Library up to 1927 is still available. Price 5s. Orders should be placed with the Secretary.

PRIVILEGES OF CHEMICAL ANALYSIS.

Analyses of soils, manures, water, etc., are made by the Society's Consulting Chemist, Dr. J. AUGUSTUS VOELCKER, M.A., F.I.C., 1 Tudor Street, New Bridge St., London, E.C., at a reduced rate for Fellows who are not engaged in any horticultural trade or in the manufacture or sale of any substance sent for analysis, and for Affiliated Societies. Full particulars of fees, methods of sampling, etc., can be obtained of the Secretary.

PUBLICATIONS.

The Society's publications include the JOURNAL, now issued to all Fellows monthly, containing an account of the Society's activities, lectures delivered at the fortnightly meetings, articles on horticultural matters specially contributed, descriptions and notes on plants to which awards have been made, accounts of work at Wisley, etc.

CURTIS'S BOTANICAL MAGAZINE, publication of which began in 1787, containing hand-coloured illustrations, descriptions and notes on new plants or plants recently introduced to gardens from abroad, published quarterly, price £3 3s. per annum.

The INDEX LONDINENSIS, an index of all illustrations of flowering plants and ferns published between 1753 and 1921, in six volumes, price £5 5s. a volume. A supplement up to the end of 1935 is in preparation.

An Index to the Society's JOURNAL from 1834 to the present time is being printed and will be published in 1937.

The LILY YEAR BOOK, price 5s. in paper, 6s. in cloth, is published annually in autumn, and the DAFFODIL YEAR BOOK, price 5s. in paper, 6s. in cloth, appears in summer.

Reports of the Society's Conferences (the latest being Rock Gardens and Rock Plants published in 1936) are also published from time to time, as well as numerous Pamphlets and Books and Lists. A full list can be obtained on application to the Secretary.

FELLOWS' TICKETS.

Fellows are particularly requested to observe the rules of the Society governing the use of personal passes and transferable tickets. The personal passes must only be used by the Fellows themselves; a transferable ticket must be retained by the person who has used it to pass him into the particular Show. All personal passes and transferable tickets must be produced to the Society's officers on demand.

ADMISSION TO MEETINGS WITHOUT TICKETS.

Any Fellow who attends the Society's Meetings at its Halls without producing his ticket will be asked to pay the entrance money and sign

his name in a special book. The entrance money will be refunded to him on written application to the Secretary.

GARDENERS' TICKETS FOR THE GREAT SPRING SHOW AT CHELSEA.

Any gardener or employee in a private, public or botanic garden, nursery or seed establishment may obtain tickets at reduced prices for the Great Spring Show, admitting on the Thursday of the Show, on application direct to the Secretary, R.H.S., Vincent Square, Westminster, S.W. 1, not less than three days before the Show. All applications must be on the special forms which may be obtained from the Secretary.

KINDRED SOCIETIES' SHOWS.

The following Kindred Societies will hold Shows in the Society's Hall on the dates given in the Calendar, and Fellows' tickets will admit: Alpine Garden Society, British Carnation Society, Rhododendron Association, Iris Society, British Delphinium Society, Cactus and Succulent Society, National Carnation and Picotee Society, British Gladiolus Society, London Gardens Society, London Allotments and Gardens Show Society, National Rose Society (September Show) and National Dahlia Society. The National Auricula and Primula Society and the London Viola and Pansy Society will stage their exhibits at the ordinary fortnightly meetings.

FORM OF BEQUEST.

I give and bequeath to the Treasurer for the time being of The Royal Horticultural Society, London, the sum of £ , to be paid out of such part of my personal estate as I can lawfully charge with the payment of such legacy, and to be paid free of legacy duty, within six months of my decease; the receipt of such Treasurer to be a sufficient discharge for the same. And I declare that the said legacy shall be applied towards [the general purposes of the Society].

ROYAL HORTICULTURAL SOCIETY'S HALLS.

When not in use by the Society, the Halls, Lecture Room and Committee Rooms may be hired at reasonable rates for any large gatherings, such as Exhibitions, Shows, Concerts, Bazaars, Meetings and Balls.

Copies of the regulations and terms for hiring the Halls and Rooms may be obtained on application to the Secretary, Royal Horticultural Society, Vincent Square, Westminster, S.W. 1.

INFORMATION AND INQUIRIES.

Fellows may obtain information and advice from the Society as to the names of flowers and fruits, on points of practice, attacks of insects and fungi, and on other questions. All inquiries should be sent direct to the Secretary, R.H.S. Offices, Vincent Square, S.W. 1.

HOW TO SEND SPECIMENS FOR IDENTIFICATION.

When inquiring the name of a plant or a fruit Fellows would greatly facilitate identification of the specimen by observing the following rules :

1. Send a good strong piece, bearing leaves and at least three blossoms. Cut the flowers in the bud stage or they will be over before they arrive. It is rarely possible and never wise to name a plant from its leaf alone, and poor specimens with only one blossom make identification unnecessarily difficult.

2. Wrap in soft paper and then pack in moss or even damp grass. Do not use cotton wool. Specimens should not be pressed.

3. Give all the information you can respecting the specimens, including the size of the plant and the country of origin or natural habitat, if known. With a garden plant, say where it is growing, greenhouse or open, sun or shade, etc.

4. Of fruits, send at least three perfect specimens of a variety. Do not send until the fruits are mature, and then choose specimens representative of the particular variety. Avoid sending bruised, diseased or abnormal fruits. Include with each variety a typical shoot with foliage. Number each variety, preferably in Roman figures, by marking the skin with a hard pencil, and keep a record of the tree from which it is gathered. Labels are often displaced during transit. Wrap each fruit in paper and pack it carefully and securely in wood-wool or similar material. Flimsy cardboard boxes are usually crushed in the post, while scented soap boxes taint the fruit and obscure the characteristic flavour. Give all the information you can respecting the age of the trees and how they are grown, *e.g.* indoors or out, as cordons, bushes or standards, etc.

5. It is a convenience if specimens are sent so as to reach the office on the day before a Show day, as it is then possible to enlist the services of the experts on the Committees.

INSPECTION OF GARDENS.

Inspection of gardens belonging to Fellows is conducted by a thoroughly competent Inspector from the Society, who reports and advises at the following cost, *viz.* : a fee of £3 3s. for one day (or £5 5s. for two consecutive days), together with all out-of-pocket expenses. No inspection may occupy more than two days, save by special arrangement. Should two or more Fellows residing in the same district, with their gardens within easy reach of one another, desire to have the services of the Garden Inspector, arrangements will be made for such a combined inspection and the fee and expenses divided by consent of those concerned. Fellows wishing for the services of an Inspector are requested to give at least a week's notice and choice of two or three days, and to indicate the most convenient railway station and its distance from their garden. Gardens can only be inspected at the *written* request of the *owner*.

SALE OF EXHIBITS AT SHOWS.

The attention of Fellows is drawn to the Society's rule that nothing may be sold for removal during a Show. Misunderstandings with regard to this rule sometimes occur, and its strict observance is essential for the smooth running of the meetings.

THE SOCIETY'S GARDENS.

Presented by the late Sir Thomas Hanbury, K.C.V.O.

WISLEY COMMITTEE

appointed under the Hanbury Trust Deed.

Trustees.

C. R. SCRASE-DICKINS, M.A., D.L.
Sir CECIL HANBURY, M.P., F.L.S.
The MARQUESS OF HEADFORT

R.H.S. Representatives.

PRESIDENT, *ex-officio*.
TREASURER, *ex-officio*.
C. T. MUSGRAVE, V.M.H.

Trustees of the Wisley Gardens Endowment Fund.

THE PRESIDENT AND COUNCIL OF THE SOCIETY.

An important part of the work of the Society is carried out at its Gardens at Wisley. The Society has always maintained a garden for the practical side of its work : in its early days at Kensington, then at Ealing and Chiswick, and finally, in 1903, through the kindness of Sir THOMAS HANBURY the present Gardens at Wisley, which were handed over to the Society in trust and which have since been considerably enlarged.

Director.

R. L. HARROW, V.M.H.

Keeper of the Laboratory.

M. A. H. TINCKER, M.A., D.Sc.,
F.L.S.

Mycology.

D. E. GREEN, M.Sc.

Entomology.

G. F. WILSON, F.L.S., F.R.E.S.,
N.D.H.

Botany.

N. K. GOULD.

Assistant for Trials.

F. C. BROWN.

Assistant for Fruit Experiments.

J. M. C. POTTER, N.D.H.

Chief Clerk.

W. D. CARTWRIGHT.

Keeper of the Gardens.

R. FINDLAY.

*Superintendent of Floral
Department.*

W. J. BLAKEY.

*Superintendent of Rock Garden
Department.*

J. T. WALL.

*Foreman of Glass
Department.*

F. G. SMITH, N.D.H.

Artist.

A. J. WISE.

Caretaker and Engineer.

W. HOLMES.

Assistant to the Director.

B. O. MULLIGAN, N.D.H.

The whole of the work at Wisley is under the control of the President and Council of the Society, whose object is to develop the garden in such a way that it will meet all the requirements of horticulture and serve not only for the enjoyment and instruction of Fellows, but also for the advancement of horticultural science.

Trials of plants, fruits, vegetables, and sundries are held annually with the object of discovering the best of their several kinds and varieties. At the same time the varieties are described and classified.

The laboratory provides accommodation for the work of the members of the staff and for the instruction of student gardeners who receive training in both the science and practice of gardening.

A prospectus of the School of Horticulture may be had on application to the Secretary, Royal Horticultural Society, Vincent Square, Westminster, S.W. 1; or to the Director, R.H.S. Gardens, Wisley, Ripley, Surrey.

Practical demonstrations of garden operations are held at suitable seasons: see Calendar of Shows and Fellows' Tickets.

ADMISSION TO THE GARDENS AT WISLEY.

The gates will be open on week-days, including Bank Holidays (but Good Friday and Christmas Day excepted), from 10 A.M. to sunset, or to 7.30 P.M. (whichever is the earlier), on Sundays from the first Sunday in April to the last Sunday in September from 2 to 6 P.M., and on Sundays in October from 2 to 5 P.M.

Fellows of the Society, on showing their tickets, have free personal admission to the Gardens on all occasions when the gates are open.

Friends of Fellows will be admitted on presenting a Fellow's Transferable Ticket, which will admit three persons in all.

The public are admitted on week-days on payment of 2s. 6d. for adults, and 1s. for children under the age of 15 years; admission on Sundays is reserved for Fellows and their Friends.

Children under the age of 15 years will not be admitted unless accompanied by an adult, who will be held responsible for their conduct while in the Gardens.

Members of affiliated Societies and of Horticultural and Scientific Institutions desirous of visiting the Gardens in parties will be afforded free admission on application to the Director of the Gardens by the responsible authority. Applications for such visits should be made at least 14 days in advance.

All other bodies desirous of visiting the Gardens in parties should apply to the Secretary of the Royal Horticultural Society, stating the number of the party and date of anticipated visit. Such parties will be required to pay 1s. a head, with a minimum of 10s., and must purchase tickets in advance.

No dogs or perambulators will be admitted. Parcels, baskets, etc., must be left at the gate.

HOW TO GET TO THE GARDENS.

The Gardens are situated at Wisley in Surrey, within a short distance of the main Portsmouth Road, about a mile on the London side of Ripley. They are distant about four miles from Byfleet and West Weybridge Stations, four from Effingham and Horsley, and five from Weybridge, all on the Southern Railway. Motors can always be hired from Mr. Howard at Byfleet Station (5s. each way), or from Messrs. Shanks, Weybridge (10s. each way).

Byfleet, West Weybridge, and Weybridge Stations are on the Southern Railway Main Line and are served by a convenient service of trains from Waterloo. There are connexions with Chertsey and Reading at Weybridge.

Effingham and Horsley Stations are served by a frequent service of electric trains from Waterloo and Guildford.

Cheap day tickets are issued from Waterloo as under :

<i>To</i>	<i>Return Fares.</i>		<i>On</i>
	<i>1st Class.</i>	<i>3rd Class.</i>	
Effingham Junction . . .	4s. 3d.	2s. 9d.	} Week-days and Sundays by all trains.
Horsley . . .	4s. 6d.	3s. 0d.	
Weybridge . . .	3s. 9d.	2s. 6d.	
West Weybridge . . .	4s. 3d.	2s. 9d.	
Byfleet . . .	4s. 6d.	3s. 0d.	

Available for return by any train on the day of issue.

An hourly service (half-hourly on Sundays in the summer) of omnibuses—Service No. 215 (Mondays to Friday), and No. 20 (Saturday and Sunday)—runs along the Portsmouth Road between Kingston Omnibus Station, near Kingston Railway Station, and North Street, Guildford, and passes within 5 minutes' walk of the Gardens; and other local services within about a mile.

Service Nos. 20 and 215 provide connexions with other services as under :

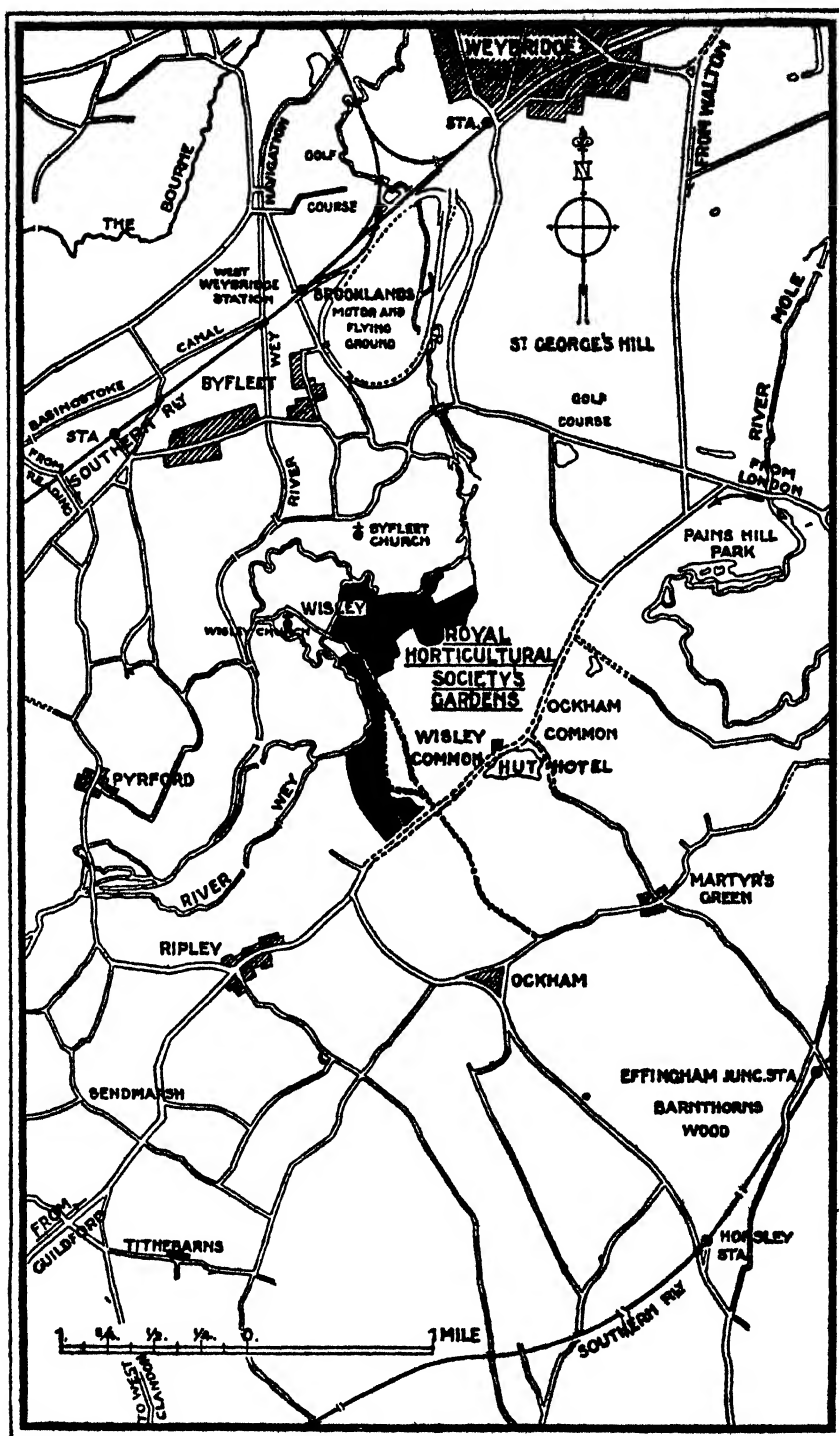
At Cobham (White Lion) with Service No. 462 for Stoke D'Abernon, Leatherhead, Weybridge, Addlestone, Chertsey, Staines, Wraysbury, and Slough.

At Esher (Bear Hotel) with Service No. 217 for Hersham and Walton-on-Thames; and Service No. 218 for Lower Halliford, Shepperton and Laleham.

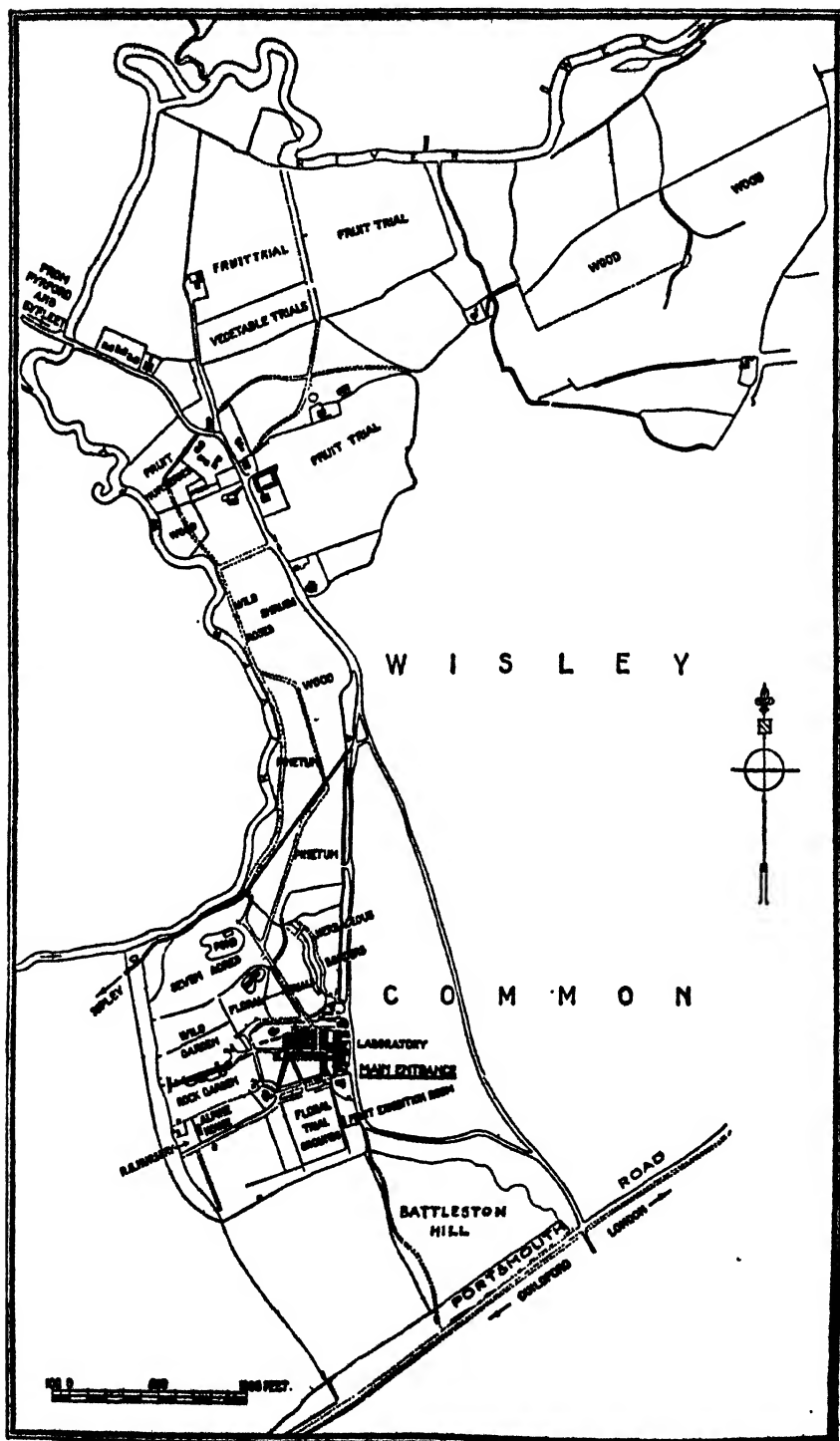
At Kingston Omnibus Station with Service Nos. 14 (Saturdays and Sundays in summer only) and 85 for Roehampton and Putney Bridge Station (District Line), with Service No. 65 for Petersham, Richmond, Brentford, and Ealing, and with Service No. 406 for Tolworth, Epsom, Tadworth, Kingswood and Reigate.

At Ripley with Service No. 436 for Woking, Byfleet, Chertsey, Bgham and Windsor.

From Guildford omnibuses run to all parts of Surrey.



WISLEY GARDENS.—ROUTE MAP.



PLAN OF THE SOCIETY'S GARDENS, WISLEY.

The "Green Line" also runs a half-hourly coach service (every 20 minutes at week-ends) between Guildford and Hertford, via Marble Arch. The coaches stop by request at the R.H.S. Gardens turning on the Portsmouth Road (5 minutes' walk).

For times the London Passenger Transport Time-tables should be consulted.

As mentioned above, trials of Fruit, Vegetables and Flowers are being continuously carried out, and these are based on a regular Calendar. The rules governing these trials at Wisley may be had on application to the Secretary, R.H.S. Offices, Vincent Square, S.W. 1, or to the Director, R.H.S. Gardens, Wisley, Ripley, Surrey, to whom all articles for trial should be addressed. The Trials arranged for 1937-38 are as follows :

INVITED TRIALS, 1937-8.

TO BE JUDGED IN 1937.

VEGETABLES.

Maincrop Peas	. . .	½ pint of each variety to be sent by January 30.
Cos Lettuces	. . .	1 oz. " " " " "
Leeks	. . .	1 " " " " "
Globe Artichokes	. . .	1 " " " " "
" " "	. . .	12 plants " " " March 31.

FLOWERS.

New Dahlias	. . .	3 plants of each variety to be sent by April 30.
New Delphiniums	. . .	3 " " " " " March 31.
New Gladioli	. . .	6 corms " " " " " March 31.
China Asters, Annual Early		
Double	. . .	1 packet " " " " " January 30.
Carnations, Annual	. . .	1 " " " " " January 30.
Lobelias (Annual Bedding)	. . .	1 " " " " " January 30.
Montbretias	. . .	6 corms " " " " " March 31.

PREPARATION FOR TRIALS IN 1938.

To prepare for the trials given in the Biennial Calendar, some of the seeds and plants are required sufficiently in advance to become established by the time appointed for their consideration by the Judges, namely :—

To be sent in 1937.	For judging in 1938.	Broccoli (January-March varieties) 1 oz. of each variety to be sent by January 30, 1937.
		Scabiosa caucasica 3 plants of each var. by September 30, 1937.

CALENDAR OF R.H.S. "INVITED TRIALS."

	1937.*	1938.*
Flowers . .	New Dahlias	New Dahlias
	New Delphiniums	New Delphiniums
	New Gladioli	New Gladioli
	New Irises	New Irises
	New Sweet Peas	New Sweet Peas
	New Border Carnations	New Border Carnations

* See above for quantities to be sent, and dates when they are required. Senders are urgently asked to consult the list which asks for certain plants, etc., to be sent a year or two in advance of that in which they will be judged.

CALENDAR OF R.H.S. "INVITED TRIALS"—*continued*.

	1937.*	1938.*
Flowers . .	China Asters, Annual Early Double Carnations, Annual Lobelias, Annual Bedding †Lupinus polyphyllus (now growing at Wisley) Montbretias	Chrysanthemums, Early Flowering (in conjunction with the National Chrysanthemum Society) China Asters, Annual 'Ostrich Plume' and 'Giant Comet' Godetias, Dwarf varieties Dimorphothecas Delphiniums, Belladonna types Scabiosa caucasica Stocks, 'Winter Brompton' and 'East Lothian'
Vegetables .	Cabbages (plants now growing at Wisley) Cos Lettuces Leeks Onions (now growing at Wisley) Maincrop Peas Globe Artichokes, plants and seeds	Broccoli, January–March var. Sweet Corn, early varieties Late Peas, maturing after 'Alderman' Cauliflowers, autumn sown

The Gardens themselves now cover nearly 228 acres, further land of about 28 acres consisting of a piece of property known as Battleston Hill and the adjoining field fronting on the Portsmouth Road having been acquired. The gardens are laid out on the general lines shown on the plan on p. 23.

A section of the work at the Gardens of national importance is the trials of all kinds of hardy fruit for commercial planting. These trials are conducted under a Joint Committee of the Ministry of Agriculture and Fisheries and the Royal Horticultural Society (see p. 53). They commenced in 1922, and many useful results are being obtained. Reports of the trials are published from time to time in the Society's JOURNAL.

DISTRIBUTION OF SURPLUS PLANTS.†

Every year in March surplus plants and seeds are distributed to those Fellows who apply for them. Of many varieties the stock is limited, and the application forms are therefore collected, and from time to time are thrown into ballots and then drawn at random. The demands of each list are then satisfied as far as the available stock permits, and those Fellows who are disappointed by not receiving the plants for which they ask, must remember that there is no other method of treating all alike.

* See above for quantities to be sent, and dates when they are required. Senders are urgently asked to consult the list which asks for certain plants, etc., to be sent a year or two in advance of that in which they will be judged.

† This trial is confined to named varieties which come true from seed.

‡ These are plants which are surplus to the requirements of the Wisley Gardens, and as the Gardens become fully planted the number available may be diminished.

Fellows are asked to remember that the plants will necessarily be small and need careful handling when received. It is obvious that owing to their numbers the plants distributed could not be kept in the Gardens and grown on until they had reached a large size.

All application forms should be returned before the end of February, and no application can be entertained which is received after the end of April.

The Society does not pay the cost of packing and carriage. The parcels must be sent by post, the postage being prepaid by the Fellows themselves. Directions as to the amount of the remittance to be sent for this purpose will be found on the application forms for plants, and Fellows are requested to follow out carefully all the directions there printed.

Fellows residing beyond a radius of thirty-five miles from London are permitted to choose double the number of plants to which they would otherwise be entitled. Fellows residing abroad, subscribing one guinea per annum, are allowed twenty packets of seeds, and higher rates of subscriptions in proportion.

Fellows residing outside the United Kingdom and Ireland may apply for seeds on the list on the form provided, but plants cannot be sent to them owing either to difficulty of transport or to Government restrictions. Endeavour will, however, be made to procure for them to a reasonable extent any rare or unusual seeds which they cannot procure in the country where they live.

No plants will be sent to Fellows whose subscriptions are in arrear, or who do not fill up their forms properly.

EXAMINATIONS IN HORTICULTURE.

The Society conducts several examinations in horticulture, and the regulations and syllabus for any of them can be obtained by writing to the Secretary, R.H.S. Offices, Vincent Square, Westminster, S.W. 1.

The dates * for these examinations are given in the Calendar.

NATIONAL DIPLOMA IN HORTICULTURE.

Written Examinations : Preliminary, Final.

Practical Examinations : Preliminary, Final.

This is the highest examination in horticulture conducted by the Society, and was established in 1912, with the sanction of the Board of Agriculture, as a test of real professional ability.

Among those for whose benefit the Diploma was established are the following : Florists, Fruit Growers, Gardeners, Horticultural Inspectors, Horticultural Instructors,† Landscape Gardeners, Market Gardeners, Nurserymen, Public-Park Gardeners and Seedsmen.

* These dates are subject to alteration.

† This does not include a School Master or Mistress who is engaged in teaching other subjects in schools, but applies only to persons whose chief work in life is devoted to giving instruction in horticulture. The examination is for the horticultural profession only.

The examination is designed to test, first, a candidate's practical knowledge and, secondly, his acquaintance with the principles underlying garden practice. The examiners will do their best to discourage "cramming," and to insist on practical experience. Books are valuable only when used intelligently to supplement experience.

TEACHERS' EXAMINATIONS IN SCHOOL AND COTTAGE GARDENING.

Preliminary Examination : Written.

Advanced Examination : Written and Practical.

This examination is not exclusively confined to members of the scholastic profession, but is open to all persons who can furnish a satisfactory certificate of having done practical work. Candidates in both the preliminary and advanced examinations must satisfy the examiners that they have had practical gardening experience.

GENERAL EXAMINATION.

General Examination for Seniors (18 years of age and over).

General Examination for Juniors (under 18 years).

This examination is held by the Royal Horticultural Society to assist the efforts of County Councils, Technical Institutes, Schools, Gardeners' Mutual Improvement Societies and other bodies to promote instruction in practical horticulture, and in the hope of rendering such instruction definite and effective.

NATIONAL CERTIFICATE IN ELEMENTARY HORTICULTURAL PRACTICE.

A new examination in horticulture for students in farm Institutes has been established open only to students who have taken at least one year's course in horticultural work and in the principles underlying horticultural practice in an approved institution. Alternative syllabuses have been prepared, and the examination will consist of both written and practical parts. Particulars of this examination may be had at the Institutions concerned.

BRITISH FLORAL ART DIPLOMA.

This examination was established in 1933 with the object of encouraging and stimulating interest in this craft by the establishment of a Diploma.

The examination is open to both men and women ; the date of the 1937 examination is given in the Calendar.

There is no age limit, but the number of candidates accepted for each examination will be limited.

There are both practical and written examinations, and Diplomas will be awarded to successful candidates.

The examination is intended primarily for florists and florists' assistants, but is not confined to members of the florists' trade.

AWARDS AND MEDALS.

The following awards are made by the Council :—

CERTIFICATES.

The awards given to plants, flowers, fruits and vegetables are :—

1. **FIRST CLASS CERTIFICATE.**—Instituted 1859. Given on the recommendation of the Fruit and Vegetable, Floral, Orchid, Narcissus and Tulip, and the Joint Committees to plants, flowers, fruits and vegetables of great excellence.

2. **AWARD OF MERIT.**—Instituted 1888. Given on the recommendation of the Fruit and Vegetable, Floral, Orchid, Narcissus and Tulip, and the Joint Committees to plants, flowers, fruits and vegetables which show a sufficiently distinct advance on their predecessors.

3. **HIGHLY COMMENDED.**

4. **COMMENDED.**

These two Awards are given on the recommendation of the Fruit and Vegetable, Floral, Orchid, Narcissus and Tulip, and the Joint Committees to noteworthy plants, flowers, fruits and vegetables after trial at Wisley or elsewhere.

5. **PRELIMINARY COMMENDATION.**—Instituted 1931. Given at Shows on the recommendation of the Floral, Orchid, Narcissus and Tulip, and the Joint Committees to seedlings and new plants of promise.

6. **BOTANICAL CERTIFICATE.**—Instituted 1878. Given on the recommendation of the Scientific Committee to plants of botanical interest.

7. **AWARD OF GARDEN MERIT.**—Instituted 1921. Given on the recommendation of the Wisley Advisory Committee to plants which either are well known to the Council, Committees and Garden Staff, or have been tested and grown at Wisley in the same manner as they would have been grown in a private garden, and have proved to be excellent for ordinary garden or greenhouse use.

A plant that has received this award is not thereby precluded from receiving other awards.

The following awards are given to individuals :—

8. **CERTIFICATE OF APPRECIATION.**—Instituted 1908. Given on the recommendation of the Scientific Committee to persons whose work is of scientific interest from a horticultural point of view, or is such as may be reasonably expected to assist in the improvement of a strain or in creating a new break.

9. **CERTIFICATE OF CULTURAL COMMENDATION.**—Instituted 1872. Given on the recommendation of the Fruit and Vegetable, Floral, Orchid, Narcissus and Tulip, and the Joint Committees to growers whose exhibits show evidence of great cultural skill.

10. **CERTIFICATE OF DILIGENT INTEREST.**—Instituted 1910. Specially intended to encourage the upkeep of small gardens, plots and window boxes, and the cultivation of plants in pots by adults and children.

The following awards are given to Sundries after trial on the recommendation of the Wisley Advisory Committee :—

(a) **AWARD OF MERIT.**

(b) **HIGHLY COMMENDED.**

(c) **COMMENDED.**

MEDALS.

1. **THE LAWRENCE MEDAL.**—Instituted in 1906 to celebrate Sir Trevor Lawrence's twenty-one years' tenure of office as President of the Society. Awarded directly by the Council annually for the best exhibit shown to the Society during the year. No exhibitor may receive this gold medal more than once in three years.

2. THE GOLD MEDAL.—Instituted in 1898. Re-designed in 1929. Awarded for exhibits of special excellence.

3. THE FLORA MEDAL.—Instituted in 1836. Awarded for exhibits of flowers and ornamental plants. Struck in bronze, silver and silver-gilt.

4. THE BANKSIAN MEDAL.—Instituted in 1820 in commemoration of Sir Joseph Banks, P.R.S., one of the founders of the Society. Awarded for exhibits of flowers and ornamental plants. Struck in bronze, silver and silver-gilt.

5. THE HOGG MEDAL.—Instituted in 1898 in commemoration of Dr. Robert Hogg, the great pomologist, sometime Secretary of the Society. Awarded for exhibits of fruit. Struck in bronze, silver and silver-gilt.

6. THE KNIGHTIAN MEDAL.—Instituted in 1836 in honour of Thomas Andrew Knight, F.R.S., President of the Society, 1811 to 1838. Awarded for exhibits of vegetables. Struck in bronze, silver and silver-gilt.

7. THE LINDLEY MEDAL.—Instituted in 1866 in commemoration of Dr. John Lindley, F.R.S., sometime Secretary of the Society. Awarded for exhibits of a plant or plants of special interest or beauty or showing exceptional skill in cultivation, and for educational exhibits. Struck in bronze, silver and silver-gilt.

8. THE GRENFELL MEDAL.—Instituted in 1919 in commemoration of Field-Marshal Lord Grenfell, President of the Society, 1913 to 1919. Awarded for exhibits of pictures, photographs or objects of a similar nature of horticultural or botanical interest. Struck in bronze, silver and silver-gilt.

9. THE WILLIAMS MEMORIAL MEDAL.—Instituted in 1896 by the Trustees of the Williams Memorial Fund in commemoration of B. S. Williams. Re-designed in 1927. Awarded directly by the Council for a group of plants and/or cut blooms of one genus which show excellence in cultivation. Fruit and vegetables are excepted. Two medals in gold are annually available for award.

10. THE P. D. WILLIAMS MEDAL.—Instituted in 1936, the fund being subscribed to commemorate the late P. D. Williams, V.M.H. Awarded for Daffodils and Rhododendrons in alternate years. In 1937 three medals are offered for award in a class at the Daffodil Show on April 15 and 16. See special schedule. Struck in gold, silver-gilt, silver and bronze.

11. THE SANDER MEDAL.—Instituted in 1923 and presented by the firm of Messrs. Sander & Sons in memory of H. F. C. Sander, F.L.S., V.M.H., the founder of the firm. Awarded to the exhibitor of the best new greenhouse plant of general utility shown to the Society during the year. Struck in gold.

12. THE GEORGE MOORE MEDAL.—Instituted in 1926 and presented by the late G. F. Moore, V.M.H. Awarded to the exhibitor of the best new Cypripedium shown to the Society during the year. Struck in gold.

13. THE HOLFORD MEDAL.—Presented by the Executors of the late Sir George Holford in 1928. Awarded for the best exhibit of plants and/or flowers (fruit and vegetables excluded) shown by an amateur during the year in the Society's Halls. Struck in gold.

14. THE SEWELL MEDAL.—Instituted in 1929 and presented by the late A. J. Sewell. Awarded for exhibits of plants suitable for the rock garden or alpine house. Struck in gold. In 1937 five medals are offered for award, two on May 4, one on June 8 and two on September 14. One medal is offered on each date for an amateur's exhibit; on the first and the last dates one medal is also offered for a horticultural trader's exhibit. Each amateur's exhibit must consist of three, and each horticultural trader's of six, pots or pans not exceeding 12 inches in diameter if circular, or 112 sq. inches in internal area if rectangular. Only one subject may be shown in each pot or pan. It is not necessary that the plants should have been grown in the receptacles in which they are shown and, if desired, plants may be lifted and potted for the purposes of the competition. Not fewer than two-thirds of the plants in each exhibit must be in bloom, and plants which are not in bloom should possess decorative value when shown. The scale of points for judging will be as follows: Suitability, 24 points; Rarity, 18 points; Cultivation, 24 points. Entries must be made on special forms obtainable from the Secretary, by whom the completed forms must be received not later than by the first post on the Wednesday preceding the show.

15. **THE VEITCH MEMORIAL MEDAL.**—Instituted in 1870 in commemoration of James Veitch of Chelsea. In 1922 the Veitch Memorial Trust was vested in the Council of the Society. Awards of medals and prizes are made annually to those who have helped the advancement of the science and practice of horticulture, and for special exhibits. Struck in bronze, silver and gold.

Any medal awarded at one of the Society's Meetings is awarded to the exhibitor and for a particular exhibit. The Award may not be advertised by anyone other than the exhibitor, and the exhibitor may only advertise the Award by using the terms of the Award card, i.e. by quoting the words "for an exhibit of Begonias," or "for an exhibit of Delphiniums," or as the case may be.

The Council, having ascertained that the majority of firms who exhibit at the Society's Meetings do not desire to possess many medals of the same grade, has decided that the first time a trade firm is awarded a medal it will be forwarded, but no medal of the same grade will be sent afterwards unless application is made within a year from the date of the award. Medals will never be sent out unengraved.

CUPS.

CHALLENGE CUPS.

The following cups are offered for award at the Society's Meetings. A challenge cup, unless otherwise stated, will be held for one year by the winner, who will be required to give a guarantee for its return in good condition. The winner will receive a certificate recording his success and, except where a replica of the cup is supplied, his gardener will receive an appropriate silver Hogg, Knightian or Banksian Medal. The decision of the Council is final and any cup may be withheld at its discretion.

1. **THE AFFILIATED SOCIETIES' CUP.**—Founded in 1908 by the Society and offered for the best collection of fruit shown by an Affiliated Society in the special class at the Fruit and Vegetable Show on October 12, 1937. For conditions see special schedule.

2. **THE CAIN CUP.**—Presented by Sir Charles Nall-Cain, Bt. (Lord Brocket) in 1920. Offered for the best exhibit shown by an amateur at the Great Spring Show at Chelsea. Applications for space should be made on the form in the schedule.

3. **THE CLAY CHALLENGE CUP.**—Presented by Messrs. Clay in 1913. Offered to the raiser of a rose of good form and colour, not in commerce before the current year, and possessing the true old rose scent, such as may be found in the old Cabbage or Provence Rose, in 'General Jacqueminot,' 'Marie Baumann,' 'Duke of Wellington,' 'General McArthur,' etc. The scent known as "tea rose" is not, for the purposes of this competition, to be counted the true old rose scent. Not more than three different varieties may be shown by one competitor. At least three and not more than six blooms or trusses of each variety will be required, together with a plant in flower and bud. The cup will be awarded only once for the same rose. Open for competition to trade and amateur growers at the Fortnightly Show on July 20, 1937. Entries must be received not later than by the first post on the Wednesday preceding the Show, on special forms obtainable from the Secretary.

4. **THE CORONATION CUP.**—Founded in 1911. Offered in 1937 for the best exhibit at the Great Autumn Show at the National Hall, Olympia, on September 29 and 30 and October 1. Application for space should be made on the form in the schedule.

5. **THE ENGLEHEART CUP.**—Founded in 1913 by the Society and offered at the annual Daffodil Show for one stem of each of twelve varieties raised by the exhibitor. See special schedule.

6. **THE FOREMARKE CHALLENGE CUP.**—Presented by Sir Francis Burdett, Bt., in 1919. Offered for twenty spikes of named Gladioli in not less than ten varieties and not more than two spikes of any one variety. Open for competition to trade and amateur growers at the Fortnightly Show on August 17, 1937. Entries must be received not later than by the first post on the Wednesday preceding the Show, on special forms obtainable from the Secretary.

7. **THE GEORGE MONRO MEMORIAL CUP.**—Presented in 1921 by Mr. George Monro and his brothers in memory of their father. Offered for the best exhibit of grapes shown by an amateur at the Fruit and Vegetable Show on October 12, 1937. The conditions of the competition will be found in the special schedule.

8. **THE GORDON-LENNOX CUP.**—Presented by Lady Algernon Gordon-Lennox in 1913. Offered for the most meritorious exhibit of fruit shown by an amateur at the Fruit and Vegetable Show on October 12, 1937. Conditions will be found in the schedule. The winner's gardener will receive a replica of the cup presented by Lady Algernon Gordon-Lennox.

9. **THE ORCHID CHALLENGE CUPS.**—Presented by the Orchid Trade. An exhibitor winning a cup three times retains the cup in perpetuity.

(a) A CHALLENGE CUP for the best group of orchids exhibited at the Great Spring Show, Chelsea, by an amateur in a space not exceeding 100 square feet.

(b) A CHALLENGE CUP for the best group of orchids exhibited at the Great Spring Show, Chelsea, in a space not exceeding 45 square feet by an amateur who employs not more than three assistants in the orchid houses, including the head gardener.

Any competitor may enter for either of the above cups, but not for both in any one year. Applications for space should be made on the form in the schedule.

(c) A CHALLENGE CUP for the best group of orchids exhibited at the Fortnightly Show on October 26 and 27, 1937, in a space not exceeding 60 square feet, by an amateur who employs not more than three assistants in the orchid houses, including the head gardener. Entries must be received not later than by the first post on the Wednesday preceding the Show, on special forms obtainable from the Secretary.

10. **THE R.H.S. VEGETABLE CHALLENGE CUP.**—Founded in 1910. Offered at the Fruit and Vegetable Show on October 12, 1937, to the competitor who secures the greatest number of first-prize points for exhibits of vegetables.

11. **THE SHERWOOD CUP.**—Presented in 1920 by the members of the Sherwood family in memory of N. N. Sherwood. Offered for award by the Council directly for the most meritorious exhibit at the Great Spring Show at Chelsea. Applications for space should be made on the form in the schedule.

12. **THE WIGAN CUP.**—Presented by Mr. A. L. Wigan in 1911. Offered in 1937 for the best exhibit of roses shown at the Great Autumn Show at the National Hall, Olympia, on September 29 and 30 and October 1. Application for space should be made on the form in the schedule.

CUPS AND TROPHIES TO BE WON OUTRIGHT.

13. **THE REGINALD CORY MEMORIAL CUP.**—This cup is given with the view of encouraging the production of hardy hybrids of garden origin, and will be awarded only to the raiser of a plant that is the result of an intentional cross. Only a hybrid of which one parent is a true species is eligible, and it must have been exhibited at one of the Society's Shows during the current year. Hybrids of annuals and biennials do not come under the scope of the award.

14. **THE CYMBIDIUM TROPHY.**—A silver trophy, presented by the Orchid Trade, is offered for award at the Fortnightly Show on March 23, 1937, for an exhibit of 12 Cymbidiums (species and/or hybrids) staged by an amateur. Entry forms may be had on application to the Secretary and must be returned not later than by the first post on Wednesday, March 17, 1937.

15. **THE CYPRIPEDIUM TROPHY.**—A silver trophy, presented by the Orchid Trade, is offered for award at the Fortnightly Show on January 12, 1937, for an exhibit of 25 Cypripediums (species and/or hybrids) staged by an amateur. Entry forms may be had on application to the Secretary, and must be returned not later than by the first post on Wednesday, January 6.

16. **A SILVER CUP FOR DAFFODILS.**—A silver cup, presented by Messrs. Barr & Sons, Ltd., is offered for award at the Daffodil Show, April 15 and 16, 1937, to the competitor who obtains the highest total number of prize-points in the single-bloom classes for amateurs. (See special schedule.)

17. **THE ODONTOGLOSSUM TROPHY.**—A silver trophy, presented by the Orchid Trade, is offered for award at the Fortnightly Show on April 20, 1937, for an exhibit of 25 *Odontoglossums* (species and/or hybrids, including *Odontiodas*, etc.) staged by an amateur. Entry forms may be had on application to the Secretary, and must be returned not later than by the first post on Wednesday, April 14, 1937.

18. **ORCHID TROPHIES**, presented by the Orchid Trade for competition at the Great Spring Show at Chelsea in 1937.

- (a) A Silver Trophy for the best twelve orchids, not more than two of any one genus, exhibited by an amateur who employs not more than two growers, including the head gardener, in his orchid houses.
- (b) A Silver Trophy for the best six orchids exhibited by an amateur who employs not more than one orchid grower or gardener.

Applications for space should be made on the form in the schedule.

Two similar trophies, presented by the Orchid Trade, are offered for competition under the same conditions at the Fortnightly Show on October 26 and 27, 1937. Entries must be received not later than by the first post on the Wednesday preceding the Show, on special forms obtainable from the Secretary.

19. **THE RIDDELL TROPHY FOR VEGETABLES.**—A silver trophy is provided each year from a fund established in 1931 by Lord Riddell for the encouragement of the cultivation and exhibition of vegetables. In 1937 the trophy is offered for award in the class for a table of vegetables at the Fruit and Vegetable Show. (See special schedule.)

20. **THE SUTTON VEGETABLE CUPS.**—Messrs. Sutton & Sons, Ltd., present annually two cups for vegetables.

One is offered for award for the best group of vegetables shown by an amateur at the Great Spring Show at Chelsea. (See special schedule.)

The other is offered for the best exhibit of twelve distinct kinds shown by an amateur in the special class at the Fruit and Vegetable Show. (See special schedule.)

21. **A SILVER TROPHY FOR CACTI AND SUCCULENTS.**—A silver trophy provided from Mrs. Sherman Hoyt's Prize Fund is offered for the best group of cacti and/or succulents staged by an amateur at the Fortnightly Show on September 14, 1937. Entries must be received not later than by the first post on the Wednesday preceding the Show, on special forms obtainable from the Secretary.

THE JONES-BATEMAN CUP.

Presented by Miss L. Jones-Bateman of Cae Glas, Abergele, in 1920, for the encouragement of fruit production. Offered triennially for original research which has added to our knowledge of cultivation, genetics, or other matters relating to fruit growing. The cup is held by the winner for three years, and on being relinquished the holder receives a Hogg medal in gold. Particulars of competition may be obtained on application to the Secretary. The Cup is available for competition in 1937.

THE LODER RHODODENDRON CUP.

Presented in 1921 by Mr. G. W. E. Loder (Lord Wakehurst) in memory of his brother, Sir Edmund Loder, Bt. The cup will be awarded annually, but not more than once in seven years to the same individual. In awarding it the judges will consider, not merely floral display, but the value to horticulture of the work of the recipient, whether such work shall include the production of flowers or not. Of the five judges, three will be appointed by the Royal Horticultural Society and two by the Rhododendron Society. The award will be made in October of each year. The cup is held by the winner for one year.

PETER BARR MEMORIAL CUP.

Presented in 1912 by the Trustees of the Peter Barr Memorial Fund in commemoration of Peter Barr, V.M.H. Awarded every year on the recommendation of the Narcissus Committee to someone who in the Committee's opinion has done good work of some kind in connexion with daffodils. The cup is held by the winner for one year.

EXHIBITIONS : GENERAL NOTES.*

Shows have been arranged for the dates given in the Calendar, but the Council reserves the right to alter the list in any way that may from time to time seem to be in the interest of the Society. All persons, whether Fellows of the Society or not, unless excluded by some special regulation, are invited to exhibit. Schedules containing special regulations are issued for the Daffodil Show, the Early Market Produce Show, the Great Spring Show, the Great Autumn Show and the Fruit and Vegetable Show.

Those who desire to exhibit at a Fortnightly Meeting at the Halls must give notice in writing to the Secretary, Royal Horticultural Society, Vincent Square, Westminster, S.W. 1, not later than by the first post on the Wednesday before the Meeting at which they wish to exhibit, stating the nature of the proposed exhibit and how much space it will occupy. Entry forms may be obtained from the Secretary, and exhibitors are requested to use them. Letters will be sent to exhibitors on the Wednesday before the Meeting saying what space has been allotted. If no letter is received by the Friday before the Meeting the exhibitor should at once communicate with the Secretary. There are no entry fees, nor are there any charges for space or staging for exhibits of plants, flowers, fruit, vegetables, pictures, plans, or models. A charge is made for space for exhibits of horticultural sundries at the Great Spring Show at Chelsea and at the Great Autumn Show at the National Hall, Olympia, but not at the Society's Halls. The Council reserves to itself the right to refuse any application for space, and, in the event of any such refusal, it is not to be required to give any reason or explanation. The allotment of space, both as regards area and position, will be in accordance with the discretion of the Council, and exhibitors must be content to abide loyally by its decision.

Fellows are specially invited to exhibit interesting or well-grown plants, flowers, fruits or vegetables, and any Fellow who desires to stage an exhibit of not more than three pots, vases, or dishes may do so at any Fortnightly Meeting, although he has not applied for space beforehand. Such exhibits must be entered with the clerk at the Small Exhibits Table by noon on the morning of the Meeting, and he will provide exhibitors' cards and stage the exhibits. Exhibitors are not permitted to place on this special table any notices or leaflets, nor may any orders be booked there. Exhibits staged under this regulation may be considered for Certificates of Cultural Commendation.

The Society's officers will, if necessary, unpack and stage small exhibits if the Secretary has been notified beforehand of their coming

* A copy of the complete regulations or exhibitions may be obtained on application to the Secretary.

and of the owner's inability to accompany them, but in no case can the Society undertake or be responsible for their repacking or return. All parcels sent by rail or post must be sent carriage paid and at the risk of the sender, addressed to the Secretary, Royal Horticultural Society, Vincent Square, Westminster, S.W. 1. A separate notification must be sent by post at the same time.

Exhibitors may, generally, begin staging at 2 P.M. on the day before a Fortnightly Meeting and continue until 10 P.M., when the lights will be turned out and the Hall closed. After 10 P.M. no goods can be admitted until the next morning. Staging may be resumed at 6.30 A.M. on the day of the Meeting. Exhibits intended for the Narcissus and Tulip Committee's inspection must be ready by 10.30 A.M. and all other exhibits by 11.30 A.M. At special Shows exhibits must be ready for inspection by the time given in the particular schedule. Vases, 6 inches and 9 inches in height, are provided by the Society. Exhibitors are at liberty to borrow them in return for a deposit of 2s. 6d. a dozen which is refunded when the vases are returned in good order at the end of the Meeting. White plates, 10 inches in diameter, may be borrowed from the Society by exhibitors free of charge.

Every exhibit (except pictures, plans, photographs, models and horticultural sundries) must be entered with the Secretary of one or other of the Committees (see pp. 40-52), viz.: the Fruit and Vegetable, the Floral (which deals with flowers, foliage plants, trees and shrubs), the Orchid, the Narcissus and Tulip, or the Scientific Committee. Exhibits intended for one Committee may not be mixed with those intended for another. Fruits and vegetables may not be combined in one exhibit, and flowers may not be mixed with either, but foliage, such as that of asparagus or small ferns, may be placed between the dishes. Tomatos rank as vegetables. Decorative vegetables, such as coloured kales, must be shown as vegetables and not mixed with flowers. Table decorations, bouquets, wreaths and sprays of flowers are excluded. Plants and produce exhibited to show the effect of different manures and soils are considered to be sundries and may only be exhibited as such. Mushroom spawn may be shown, but only among the sundries. Neither artificial nor dyed or surface-coloured flowers or foliage may be exhibited. No dormant bulbs or corms, and no plants ordinarily grown for their flowers or fruits, but not in flower or fruit, can be admitted to the Society's Meetings, unless specially permitted by the regulations or as horticultural sundries. Miniature gardens (other than "trough gardens" used for the cultivation of alpinas which are difficult to grow) may only be shown as sundries.

Pictures and photographs of plants, flowers, and gardens, and plans and models of gardens, may be exhibited at the Society's Fortnightly Shows during November, December, January and February. Only works which are definitely of horticultural or botanical interest are invited. Paintings of flowers should be at least life-size; miniatures are unsuitable for the Society's exhibitions. Pictures executed in

needlework or modelled in paper, and all fanciful or fancy-work objects, pictures, calendars, Christmas cards and similar objects are also unsuitable and may not be shown. Sundries may be shown in the Halls during December and January. As in 1937 there is only one Show in December, sundries will be admitted on November 30, if space permits. Sundries may also be exhibited at the Great Spring Show at Chelsea and the Great Autumn Show at the National Hall, Olympia. Only sundries of a distinctly horticultural nature may be shown. Neither raffia in the form of dolls or other fancy figures, pot-pourri, scent, ladies' smocks, nor embroidered or other fancy aprons are regarded as horticultural.

Only actual exhibitors, and such assistants as may be necessary for the arrangement of the exhibits, will be admitted before the exhibition is opened to the public. All persons, except such as may be retained by the Society, must retire at the time fixed for judging. Exhibitors' passes will be issued when necessary. Photographs may be taken at the Society's exhibitions only by those holding photography permits issued by the Secretary. Smoking is strictly prohibited in the Halls during the hours of the exhibitions.

After judging has taken place, nothing exhibited may be altered or removed until the close of the Show, except by permission of the Secretary. This does not apply to faded flowers, which should be replaced. Nothing exhibited may be removed from the Meetings until after the time of closing without special permission in writing. Exhibitors are forbidden to sell plants, flowers, fruit, vegetables or other articles for removal during the Meeting. The door-keepers have instructions to see that this rule is observed. In order not to deter the owners of new or special plants from submitting them to the Committees for award, the Council has decided that written application may be made to the Society for leave to remove such plants at 5 P.M. on the first day of any two-day Meeting at the Society's Hall. The Council hopes that sparing use will be made of this privilege, and that application will be made only in cases of urgent necessity. Nothing may be removed from an exhibit under this regulation until the written application has been signed by the Secretary. All goods must be removed from the Halls by 9 o'clock on the evening the Show closes, unless special arrangements have been made with the Secretary. Anything left on the premises remains there at the owner's sole risk.

All exhibits, personal property, etc., shall be at the risk of the exhibitors, and the Society shall not be liable for compensation for loss or damage by theft, fire, water, accident, the requirements of the London County Council, or any other cause whatsoever. Should a Show from any cause not be held, no exhibitor shall have any claim on the Society or its officers for loss, damage, interest, or compensation. Exhibitors will be wholly responsible for any claim made by their employees under the Employers' Liability Acts or the Workmen's Compensation Act, etc. The Society has no responsibility to any but its own employees.

THE COMMITTEES AND THEIR WORK.

COMMITTEES are appointed annually to meet in connexion with the Society's Shows and other activities. Some are nominated entirely by the Council, while others are appointed jointly by the Council and the governing bodies of allied societies. One of the principal objects of these Committees is to encourage the introduction of new species of plants and the production of new and improved varieties of decorative plants, flowers, fruits and vegetables, by examining and reporting upon such as may be submitted either at exhibitions or for trial. Awards are made by the Council to meritorious objects upon the recommendations of these Committees. Another function of the Committees is to collect and disseminate information about plants, flowers, fruits, vegetables and other objects of horticultural interest, including information regarding the classification and nomenclature of garden plants, and the incidence and control of diseases and pests. Certain Committees report upon the merits of non-competitive exhibits staged in the Exhibition Halls at Fortnightly Shows, and awards made by the Council are based largely on the Committees' recommendations.

In connexion with the submission of new plants to the Committees for certificate or for selection for trial, each plant must be entered with the Secretary of the appropriate Committee, who will say where the plant should be placed. Forms for this purpose may be obtained from the Society's Office before the Committee Meetings, or from the Secretaries of the Committees on the mornings of the Committee Meetings. All plants submitted to the Committees should be named as a means of future identification. If the exhibitor believes that the plant has a name, although it is unknown to him, the words "Name unknown" should be written on the entry form in the place provided for the name, and the Committee will then endeavour to identify the plant. If the plant is of garden origin, it should be named by its owner or raiser before it is submitted to the Committee. The names must conform to the Rules of Nomenclature adopted at the Ninth International Horticultural Congress held in London in 1930 (see p. 38). No award will be made to anything without a name. If the naming is in doubt, the award may be made subject to the verification of the name, and if the proposed name does not conform to the Rules of Nomenclature, any award made will be subject to the alteration of the name. Exhibitors are particularly requested to supply the information required by the entry form, and also any additional particulars which they may think interesting for publication. They will also greatly facilitate the work of the Committees by sending specimens of well-known varieties for comparison.

In considering a new plant it is laid down—(a) that no recommendation for a First Class Certificate or an Award or Merit shall be made to the Council unless at least six members vote for it ; (b) that no recommendation for an Award shall be made unless the number of votes cast in favour of it is at least double the number recorded against it ; and (c) that while the merits of an exhibit shown by a member of the Committee, or in which any member of the Committee is professionally interested, are under discussion, the member concerned must withdraw and not take part in the voting.

Specimens of plants that have received Awards or that have been selected for trial will be placed on the New-Plant Stand in the Hall. Exhibitors entering new plants before the Committees must understand before doing so that if the variety is selected for trial, they tacitly agree to send the number of plants or seeds of it required for trial the following year, and that if any Award is made, they give their consent to the object being painted or photographed for the Society.

THE NAMING OF PLANTS.

NAMES are given to plants so that when they are spoken or written about there may be no confusion as to the particular plant referred to. Every plant must therefore bear one name only, which must be universally accepted.

At the International Horticultural Conferences of London in 1930, Paris in 1932, and Rome in 1935, the nomenclature of garden plants was fully discussed and general agreement was reached on most matters that relate to the naming of garden plants.

The principles governing the naming of plants by botanists were accepted as the basis for the naming of plants of garden origin, these principles being :—

1. A plant can bear but one valid name.
2. The valid name is the earliest which conforms to the accepted Rules of Nomenclature.

Names of species and botanical varieties are framed according to the Rules of Botanical Nomenclature agreed at the Botanical Congress of Vienna in 1905 and revised at the Congresses of Brussels in 1910, Cambridge in 1930, and Amsterdam in 1935.

Briefly the botanical name of a species consists of two words of Latin form. The first is that of the genus to which the plant belongs, written with an initial capital letter; the second, the earliest specific name given by Linnæus in 1753 or by botanists subsequently, so long as it conforms with the rules, written usually with a small initial letter (e.g. *Berberis aggregata*). A capital initial letter is, however, given where specific names are derived from names of persons (but not places) (e.g. *Berberis Wilsonae*, *Campanula Allionii*) or are those of old genera (e.g. *Crataegus Oxyacantha*, *Ranunculus Flammula*). The Paris Conference recommends that for horticultural purposes all specific names should be written with a small initial letter.* The gender of the specific name is the same as that of the genus (e.g. *Ranunculus parnassifolius*, *Primula japonica*, *Arum maculatum*, but most trees are regarded as feminine, so *Quercus sessiliflora* and *Fagus sylvatica* are correct).

For a full discussion of these botanical names the " Rules " should be consulted.

In order to obtain uniformity in the use of generic names, a list of the genera which are sometimes divided by botanists has been drawn up and recommendations are made as to the name to be retained in horticulture. These names are chosen in conformity with the Rules and apply only where differences of treatment are given by botanists. At the Horticultural Congress in Rome in 1935 a list of specific names of plants of horticultural interest was agreed for international use for the ensuing six years, and in addition certain lists of names of garden varieties were also adopted as standards for future use.

Names of botanical varieties follow the name of the species to which they belong. Thus, e.g., the botanical varieties of *Narcissus triandrus* would be *Narcissus triandrus* var. *albus*, *N. triandrus* var. *calathinus*, *N. triandrus* var. *concolor*, and so on. These varietal names follow the same rules as specific names.

Names of species and botanical varieties are thus fully provided for.

Plants raised in gardens as seedlings or sports of these species or as hybrids between species often have to be named by non-botanical people, and the following rules, agreed to at the International Horticultural Conferences of London and Paris, are for their guidance. They are based on the principles and rules which have been briefly outlined.

- (a) The name of a horticultural variety should be placed after that of the species to which it belongs, and its status should, or may, be indicated by the contraction " var." Examples are given below.
- (b) The varietal name should be of Latin form only when it expresses some character of the plant, e.g. *nanus*, *fastigiatus*, *albus*, or its place of origin, e.g. *hewensis*.

The use of Latin proper names for horticultural varieties is not permissible, e.g. *Iris pallida Smithii* would be an inadmissible name for a garden variety.

* This recommendation follows the practice of zoologists in naming animals. For the present the Society thinks it better to follow the recommendation in the " Rules of Botanical Nomenclature " in its own publications. .

- (c) The name will thus usually be a "fancy" name, beginning with a capital letter, e.g. *Galega officinalis* var. 'George Hartland,' not *Galega officinalis* var. *Hartlandii*; *Dianthus deltoideus* var. 'Brilliant,' not *Dianthus deltoideus* var. *brilliantissimus*; Pea 'Masterpiece.'
- (d) Varietal names must not be translated when transferred from other languages, but must be preserved in the language in which they were originally described. Where desirable a translation may be placed in brackets after the varietal name.
- (e) As far as possible names of horticultural varieties should consist of a single word; the employment of not more than three words is permitted as a maximum.
- (1) A varietal name in use for one variety of a kind of plant should not be used again for another variety of that kind, even though it may be attached to a different species.
That is, the use of the name *Narcissus Pseudonarcissus* 'Victoria,' should preclude the use of 'Victoria' as a varietal name for any other species of *Narcissus*, such as *Narcissus poeticus* 'Victoria.' Similarly there should be but one *Iris* 'Bridesmaid,' one Plum 'Superb' and so on.
- (2) Varietal names likely to be confused with one another should be avoided. For instance, the use of the name 'Alexander' should preclude the use of 'Alexandra,' 'Alexandria,' and 'Alexandrina' as varietal names for the same kind of plant.
- (3) Where personal names are used to designate varieties, the prefixes "Mr.," "Mrs.," "Miss," and their equivalents should be avoided.
- (4) Excessively long words and words difficult to pronounce should be avoided in coining varietal names.
- (5) The articles "a" and "the" and their equivalents should be avoided in all languages when they do not form an integral part of a substantive, e.g. 'Colonel,' not 'The Colonel'; 'Giant,' not 'The Giant'; 'Bride,' not 'The Bride.'
- (6) Existing names in common use should not be altered to conform to these rules, but attention should be paid to them in all new names proposed.
- (f) The names of horticultural hybrids are formed in the same way as those of horticultural varieties (see paras. a-e).
[Hybrids are indicated by the multiplication sign \times placed before the name of the hybrid.]
- (g) The "genus" of bigeneric hybrids (i.e. hybrids between species of two different genera) is designated by a formula showing the parent genera in alphabetical order, and where necessary by a name compounded of the names of both genera, e.g. *Laeliocattleya*, *Urceocharis*, *Chionoscilla*.
- (h) The "genus" of multigeneric hybrids (i.e. hybrids between species of three or more genera) is also designated by a formula and/or a conventional name, preferably that of a distinguished person to which is added the termination "ara," e.g. *Potinara*, *Vuylestekeara*. The names of trigeneric hybrids already in use, e.g. *Brassolaeliocattleya*, should be retained. All hybrids in which the same genera are combined receive the same generic name, no matter how they were combined, e.g. the same generic name would apply to all combinations of the genera *Brassavola*, *Cattleya*, *Epidendrum* and *Laelia*.
- (i) All plants raised by crossing the same two species of plants receive the same specific name, variations between the seedlings being indicated where necessary by varietal names framed as already described. In practice in cross-bred plants, the specific name is frequently omitted, e.g. *Iris* 'Ambassadeur.'
- (k) In order to be valid, a name must be published.
- (l) The publication of a name of a horticultural variety or hybrid is effected by a recognizable description, with or without a figure, in any language written in Roman characters.
- (m) The description must appear in a recognized horticultural or botanical periodical, or in a monograph or other scientific publication, or in a dated horticultural catalogue.
- (n) The mention of a variety without description in a catalogue, or in the report of an exhibition, is not valid publication, even if a figure is given. It is desirable that descriptions of new varieties in horticultural catalogues should also be published in periodical horticultural papers.

SCIENTIFIC COMMITTEE FOR 1937.

The Scientific Committee reports upon diseases, pests, newly imported plants, first hybrids between species, curious plants, inventions and such other objects of horticultural interest and value as may be brought before it by Fellows and by other Committees of the Society, deals with the determination of doubtful plants and their correct nomenclature, and considers proposals and makes recommendations for Botanical Certificates and Certificates of Appreciation. Fellows are therefore strongly urged to send specimens, with explanatory notes, of any new plants, of attacks of insects or fungi, or of other similar troubles on which they would like to obtain the opinion of the Committee. As full reports as possible will be published in the Society's JOURNAL and forwarded to the senders. All communications should be addressed to "The Secretary of the Scientific Committee, Royal Horticultural Society, Vincent Square, Westminster, S.W. 1," and must reach the Society's offices not later than 2 P.M. on the day of the Meeting.

In considering the recommendation of the Botanical Certificate, regard is paid to (a) the special botanical interest of the plant exhibited; and (b) the desirability of encouraging the introduction and exhibition of novelties, even though they may not be of immediate commercial value, nor of a specially decorative character. Peculiarity of morphological or anatomical construction, physiological endowments, or adaptation to varying conditions; novelty, whether of introduction or of cultural origin; geographical distribution; potential value for garden or economic uses are all matters to be taken into account.

CHAIRMAN.

BOWLES, E. A., M.A., F.L.S., F.R.E.S., V.M.H., Myddelton House, Waltham Cross.

VICE-CHAIRMEN.

COTTON, A. D., O.B.E., F.L.S., The Herbarium, Royal Botanic Gardens, Kew.

RENDELE, A.B., M.A., D.Sc., F.R.S., F.L.S., V.M.H., Talland, The Mount, Fetcham Park, Leatherhead, Surrey.

CHITTENDEN, F. J., F.L.S., V.M.H., R.H.S. Offices. (*Secretary*.)

ARKWRIGHT, Sir JOHN S., J.P., D.L., Kinsham Court, Presteign, Radnorshire.

ARMSTRONG, Prof. H. E., LL.D., F.R.S., 55 Granville Park, Lewisham, S.E. 13.

BAKER, E. G., 3 Cumberland Road, Kew, Surrey.

BAKER, F. J., A.R.C.S., Fisherswood, Sharnal Street, Hoo, Rochester, Kent.

BAKER, W. G., The Botanic Garden, Oxford.

BALFOUR, F. R. S., M.A., D.L., J.P., V.M.H., 13 Collingham Gardens, S.W. 5.

BARKER, Prof. B. T. P., M.A., University of Bristol Research Station, Long Ashton, Bristol.

BARNES, Dr. B., Department of Biology, Chelsea Polytechnic, Manresa Road, S.W. 3.

BESANT, J. W., Botanic Garden, Glasnevin, Dublin, N.W. 3.

BEWLEY, W. F., C.B.E., D.Sc., Experimental and Research Station, Cheshunt, Herts.

BLACKMAN, Prof. V. H., M.A., Sc.D., F.R.S., Imperial College of Science, S.W. 7.

BLAIR, K. G., Sc.D., F.R.E.S., British Museum (Natural History), Cromwell Road, S.W. 7.

CRANE, M. B., A.L.S., John Innes Horticultural Institution, Mostyn Road, Merton Park, S.W. 19.

FARMER, Sir JOHN B., LL.D., D.Sc., F.R.S., V.M.H., St. Leonards, Weston Rd., Bath.

FRYER, J. C. F., O.B.E., M.A., F.R.E.S., Plant Pathological Laboratory, Milton Road, Harpenden, Herts.

GROVE, A., F.L.S., V.M.H., Branstone Lodge, Kew Road, Kew, Surrey.

HALES, W., A.L.S., V.M.H., Chelsea Physic Garden, S.W. 3.

- HALL, Sir DANIEL, K.C.B., LL.D., D.Sc., F.R.S., V.M.H., John Innes Horticultural Institution, Mostyn Road, Merton Park, S.W. 19.
 HANBURY, F. J., F.L.S., F.R.E.S., V.M.H., Brockhurst, East Grinstead, Sussex.
 HILL, Sir ARTHUR W., K.C.M.G., M.A., Sc.D., F.R.S., F.L.S., V.M.H., Royal Botanic Gardens, Kew, Surrey.
 HOOPER, CECIL H., F.L.S., F.S.I., Oxenturn, Wye, Kent.
 HOSKING, A., 47 Poltimore Road, Guildford, Surrey.
 HURST, C. C., Sc.D., Ph.D., F.L.S., D.L., J.P., 50 Knighton Drive, Leicester.
 JACKSON, A. BRUCE, A.L.S., 3 The Avenue, Kew Gardens, Surrey.
 KEEBLE, Sir FREDERICK, C.B.E., M.A., Sc.D., F.R.S., F.L.S., Cedron House, Fowey, Cornwall.
 MARSDEN-JONES, E. M., F.L.S., The Potterne Biological Station, Devizes, Wilts.
 ODELL, J. W., 116 Welldon Crescent, Harrow, Middlesex.
 PERCIVAL, Prof. J., M.A., Sc.D., F.L.S., Leighton, Shinfield, Reading, Berks.
 PRAIN, Lieut.-Col. Sir DAVID, C.M.G., C.I.E., LL.D., F.R.S., F.L.S., V.M.H., The Well Farm, Warlingham, Surrey.
 PRESTON, F. G., University Botanic Garden, Cambridge.
 RAMSBOTTOM, J., O.B.E., M.A., F.L.S., British Museum (Natural History), Cromwell Road, S.W. 7.
 RUSSELL, Sir E. JOHN, D.Sc., F.R.S., Rothamsted Experimental Station, Harpenden, Herts.
 SALISBURY, Dr. E. J., F.R.S., University College, Gower Street, W.C. 1.
 SALMON, Prof. E. S., F.L.S., South-Eastern Agricultural College, Wye, Ashford, Kent.
 SMITH, Sir WILLIAM WRIGHT, M.A., F.R.S.E., F.L.S., V.M.H., Royal Botanic Garden, Edinburgh, 4.
 VOELCKER, J. A., C.I.E., M.A., Ph.D., F.I.C., F.L.S., 1 Tudor Street, E.C. 4.
 WEISS, Prof. F. E., D.Sc., LL.D., F.R.S., F.L.S., Easedale, Woodway, Merrow, near Guildford, Surrey.
 WILSON, GURNEY, F.L.S., c/o R.H.S. Offices.
 WORSDELL, W. C., 11 Westbourne House, Twickenham, Middlesex.
 WORSLEY, A., J.P., The Cliff, 3 Bath Road, I. of W.

NOTE.—Members of the Council are Members of this Committee, and Chairmen of Standing and Joint Committees are *ex-officio* members.

The Committee will meet at 4 P.M. on the first day of all Fortnightly Meetings.

FRUIT AND VEGETABLE COMMITTEE FOR 1937.

CHAIRMAN.

BUNYARD, E. A., F.L.S., Allington, Maidstone, Kent.

VICE-CHAIRMEN.

NIX, C. G. A., V.M.H., Tilgate, Crawley, Sussex.

POUPART, W., V.M.H., Ferndale, Rydens Road, Walton-on-Thames, Surrey.

POTTER, J. M. S., R.H.S. Gardens, Wisley. (*Secretary*.)

BARNETT, H. T., Westwood House, Tilehurst, Berks.

BASHAM, JOSEPH, Fair Oak Nurseries, Bassaleg, near Newport, Mon.

BOSTOCK, F., Pitsford House, Northampton.

BULLOCK, A., 158 Northwood Way, Northwood Hills, Middx.

CRANE, M. B., A.L.S., John Innes Horticultural Institution, Mostyn Road, Merton Park, S.W. 19.

DIVERS, W. H., V.M.H., Westdean, Hook, near Surbiton, Surrey.

EARL, W. J., Knowsley Gardens, Prescot, Lancs.

FALCONER, A., Secretary's Office, Stamford Park, Stalybridge, Cheshire.

GILES, W. F., Furzebank, 38 Redlands Road, Reading, Berks.

HALL, H. J., The Gardens, Harewood, near Leeds.

HALL, R. H., The Gardens, Hatfield House, Hatfield, Herts.

HOLLOWAY, W. H., The Gardens, Tewin Water, Welwyn, Herts.

JORDAN, F., V.M.H., Yewdene, Edenbridge, Kent.

KELF, GEO., 140 Ivy Road, Cricklewood, N.W. 2.

LAXTON, E. A. L., V.M.H., 63 High Street, Bedford.

LOBJOIT, Sir WILLIAM G., O.B.E., J.P., V.M.H., Oakdens, Wooburn, High Wycombe, Bucks.

MARKHAM, H., Wrotham Park Gardens, Barnet, Herts.

METCALFE, A. W., Rozel, Hatfield Road, St. Albans, Herts.

MODRAL, W. C., The Gardens, Old Warden Park, Biggleswade, Beds.

NEAL, E., The Gardens, Tilgate, Crawley, Sussex.

NEAME, THOMAS, The Offices, Macknade, Faversham, Kent.

PRINCE, H., 119 St. Peter's Road, Earley, Reading, Berks.

RAWES, A. N., c/o T. Rivers & Son, Ltd., The Nurseries, Sawbridgeworth, Herts.

RICHARDS, J. M., The Gardens, Gatton Park, Reigate, Surrey.

SECRET, F. A., F.L.S., V.M.H., Holly Lodge Farm, Rydens Road, Walton-on-Thames, Surrey.

SMITH, A. C., The Green Farm, Shillington, near Hitchin, Herts.

STREETER, F., Petworth Park Gardens, Petworth, Sussex.

TAYLOR, H. V., O.B.E., B.Sc., Ministry of Agriculture and Fisheries, S.W. 1.

TOMALIN, T. E., Stansted Park Gardens, Rowlands Castle, Hants.

TUCKETT, P. DEBELL, 17 Durham Villas, Kensington, W. 8.

WESTON, J. G., The Gardens, Chatsworth, Bakewell, Derbyshire.

WILSON, JAMES, The Gardens, Trent Park, New Barnet, Herts.

WOODWARD, J. G., Barham Court Gardens, Teston, Maidstone, Kent.

NOTE.—Members of the Council are Members of this Committee.

The Committee will meet :

at 12 NOON on the first day of all Fortnightly Meetings, and at the Early Produce Show, Thursday, April 15; at 11 A.M. on Tuesday, May 25, at Chelsea; and at 12 NOON at the Great Autumn Show at the National Hall, Olympia, on Wednesday, September 29.

Entries at Chelsea Show must be handed in by 10.15 A.M. on Tuesday, May 25; at other meetings by 11.30 A.M.

All fruits for certificates must be ripe or in such a condition that their quality may be estimated. To permit a correct description being drawn up, a sufficient sample must be sent for tasting, together with leaves (if available), and a small branch to show the growth. Of apples, pears, peaches, nectarines, apricots, and plums—not fewer than nine must be sent; of damsons and bullaces—thirty fruits; of cherries and raspberries—fifty fruits; of strawberries—twenty fruits; of gooseberries—thirty fruits; of red and white currants—thirty bunches; of black currants—one pound; of nuts—one pound; of tomatoes—two plants in fruit. Details of the origin and chief characteristics of the variety, together with the age of the tree, must be given on the entry form. In the case of peaches and nectarines, the size of the flowers must be stated.

A First Class Certificate can only be awarded to a variety which has received an Award of Merit, and when its growth and cropping habits are known to several Members of the Committee. If necessary the Chairman will appoint a Committee of three to inspect and report upon the growing tree. Promising varieties of hardy fruits are recommended for the trials for commercial purposes at Wisley.

Awards are not made to the following plants until their cropping qualities and distinctive merits have been ascertained by trial at Wisley:—Beans, Brassicas, Cucumbers, Melons, Peas, Potatos, Tomatos, and similar fruits and vegetables. Awards are not recommended in London to plants which can be, and usually are, raised each year from seed and brought to maturity within a year from the sowing of the seed. Nor are awards recommended independently in London to plants which are usually perpetuated by seed if the class to which they belong is under trial at Wisley, has been tried in the previous year, or is on the Trials Calendar for the ensuing year. Awards to plants commonly grown from seed each year are given to the strain and not to the individual plants.

FLORAL COMMITTEE A FOR 1937.

Floral Committee A deals with Florists' Flowers and Plants, except Orchids, Narcissi and Tulips, Dahlias, Delphiniums, Irises, Perpetual-Flowering and Border Carnations and Picotees, Sweet Peas. For these see the Special or Joint Committees.

CHAIRMAN.

BRIDGEFORD, J. M., 27 Drury Lane, Covent Garden, W.C. 2.

VICE-CHAIRMEN.

CRANE, D. B., 50 Cholmeley Crescent, Cholmeley Park, Highgate, N. 6.
 INGAMILLS, D., 27 Catherine Street, Covent Garden Market, W.C. 2.
 LEAK, G. W., V.M.H., Flint House, Lynn Road, Wisbech, Cambs.

CARTWRIGHT, W. D., R.H.S. Gardens, Wisley. (*Secretary.*)

ALLAN, D., c/o Dobbie's Seed Farms, Marks Tey, Essex.
 ALLWOOD, M. C., F.L.S., Wivelsfield Nurseries, Haywards Heath, Sussex.
 CAMPBELL, D., New Lodge, Inner Circle, Regent's Park, N.W. 1.
 CHURCHER, Major GEO., Beckworth, Lindfield, Haywards Heath, Sussex.
 DARLINGTON, H. R., M.A., F.L.S., Park House, Potters Bar, Middlesex.
 DAWKINS, A., c/o Alfred Dawkins (Chelsea), Ltd., 408 King's Road, Chelsea S.W. 10.
 DICKSON, HUGH, c/o T. Cullen & Sons, Witham, Essex.
 ENGELMANN, C., Saffron Walden, Essex.
 JAMES, E. R., Iwerne, London Road, Reading, Berks.
 LANGDON, C. F., V.M.H., Twerton Hill Nursery, Bath, Somerset.
 PAGE, COURTNEY, 117 Victoria Street, S.W. 1.
 RIDING, JAS. B., The Nurseries, Chingford, E. 4.
 SIMMONS, D. W., 11 Harlesden Road, St. Albans, Herts.
 SMITH, Mrs. LINDSAY, Postford House, Chilworth, Surrey.
 STEVENSON, T., Colham Green Nurseries, Hillingdon, Middlesex.
 STEWART, W., Royal Hospital, Chelsea, S.W. 3.
 TRACEY, Mrs. I. A., High Hall, Wimborne, Dorset.
 TRESEDER, F. G., The Nurseries, Cardiff.
 WELLS, BEN., Hardy Plant Nurseries, Merstham, Surrey.
 WEST, J. T., Tower Hill, Brentwood, Essex.
 WIGHTMAN, Lady, The Garden House, Bengoe, Hertford, Herts.
 WILKIN, H. T., c/o Carter's Tested Seeds, Ltd., Raynes Park, S.W. 20.

NOTE.—Members of the Council are Members of this Committee.

The Committee will meet :

at 12.15 P.M. on the first day of all Fortnightly Meetings ; at 11.45 A.M. at Chelsea on Tuesday, May 25 ; and at 12.15 P.M. at the Great Autumn Show at the National Hall, Olympia, on Wednesday, September 29.

Entries must be handed in to the Secretary of the Committee by 10.15 A.M. at Chelsea, and by 11.45 A.M. on all other occasions when the Committee meets.

The number of specimens required varies according to the heading under which an award is sought ; for an award as a show flower, at least three open blooms, either cut or on a plant or plants, must be shown ; for an award as a variety for cutting or for market, at least sufficient cut flowers to fill a vase, and in the case of a rose or chrysanthemum, a plant in bloom ; for an award as an ornamental pot-plant, at least three plants in pots, one of which, in the case of a chrysanthemum, must be shown without any disbudding while the other two should be somewhat disbudded ; for an award as a bedding plant, one plant will usually be sufficient ; and for an award as a variety for the herbaceous border in all practicable cases at least one growing plant will be required, but cut specimens, if sufficient, will be admissible when the habit of the plant is well known.

The following florists' flowers and plants are given awards (except Preliminary Commendation) only after trial at Wisley :—Anemone (Japanese), Aster (Michaelmas Daisy), Aubrietia, Alpine Auricula, Chrysanthemum (early flowering, for garden decoration), Cistus, Clematis, Dianthus (Pinks), Fuchsia, Gladiolus, Helianthemum, Hemerocallis, Kniphofia, Lupinus (perennial), Phlox (herbaceous and alpine), Primrose, Pyrethrum, Veronica (herbaceous), Viola. When any of these plants are submitted to the Committee in London, and considered worthy, they are selected for trial at Wisley.

No award, except Preliminary Commendation, is recommended in London to plants which can be, and usually are, raised each year from seed and flowered within a year from the sowing of the seed ; and no award, except Preliminary Commendation, is recommended independently in London to plants which are usually perpetuated by seed if the class to which they belong is under trial at Wisley, has been tried in the previous year, or is on the Trials Calendar for the ensuing year. All plants which receive Preliminary Commendations under this regulation are selected for trial at Wisley. Awards to plants commonly grown from seed each year are given to the strain and not to individual plants.

FLORAL COMMITTEE B FOR 1937.

Floral Committee B deals with Plants other than Florists' Flowers and Plants, except Orchids other than hardy terrestrial kinds, Narcissi and Tulips, Dahlias, Delphiniums, Irises, Rhododendrons, Rock-garden and Alpine-house Plants. For these see Special or Joint Committees.

CHAIRMAN.

MUSGRAVE, C. T., V.M.H., Olivers, Hascombe, Godalming, Surrey.

VICE-CHAIRMEN.

ABERCONWAY, Lord, C.B.E., V.M.H., 38 South Street, Mayfair, W. 1.

BRAN, W. J., C.V.O., I.S.O., V.M.H., 2 Mortlake Road, Kew, Surrey.

BOWLES, E. A., M.A., F.L.S., F.R.E.S., V.M.H., Myddelton House, Waltham Cross, Herts.

GOULD, N. K., R.H.S. Gardens, Wisley. (*Secretary.*)

BAKER, G. P., V.M.H., Hillside, Oakhill Road, Kippington, Sevenoaks, Kent.

BAKER, W. G., The Botanic Garden, Oxford.

BALFOUR, A. P., c/o Sutton & Sons, Ltd., Seed Trial Grounds, Slough, Bucks.

BOWES-LYON, The Hon. DAVID, St. Paul's Waldenbury, Hitchin, Herts.

BYNG OF VIMY, The Viscountess, Thorpe Hall, Thorpe-le-Soken, Essex.

CLARKE, Col. STEPHENSON R., C.B., J.P., LL.D., V.M.H., Borde Hill, Haywards Heath, Sussex.

COMBER, J., V.M.H., The Gardens, Nymans, Handcross, Sussex.

COUTTS, J., V.M.H., Royal Botanic Gardens, 197 Kew Road, Kew, Surrey.

CRANFIELD, W. B., F.L.S., V.M.H., East Lodge, Enfield Chase, Middlesex.

ELLIOTT, CLARENCE, Six Hills Nursery, Stevenage, Herts.

FARDEN, R. S., Ridgehurst, Ridgeway, Sutton, Surrey.

FENWICK, MARK, J.P., Abbotswood, Stow-on-the-Wold, Glos.

HALES, WM., A.L.S., V.M.H., Chelsea Physic Garden, S.W. 3.

HARTINGTON, The Marquess of, M.P., Churchdale Hall, near Bakewell, Derbyshire.

HAY, T., M.V.O., V.M.H., New Lodge, Hyde Park, W. 2.

INGWERSEN, W. E. TH., Birch Farm Hardy Plant Nursery, Gravetye, East Grinstead, Sussex.

JENKINSON, Capt. R. C. H., Knap Hill Manor, near Woking, Surrey.

LAWRENCE, Lady, Riverdale, Dorking, Surrey.

MARSDEN-JONES, E. M., F.L.S., The Potterne Biological Station, Devizes, Wilts.

NOTCUTT, R. C., Woodbridge, Suffolk.

OLDHAM, W. R., J.P., Sherwood, Windlesham, Surrey.

PERRY AMOS, V.M.H., Hardy Plant Farm, Enfield, Middlesex.

PRESTON, F. G., University Botanic Garden, Cambridge.

REUTHE, G., Sunnycroft, 109 Crown Lane, Bromley, Kent.

ROSSE, The Earl of, Birr Castle, King's Co., Ireland.

RUSSELL, L. R., V.M.H., Richmond Nurseries, London Road, Windlesham, Surrey.

STANLEY, Lady BEATRIX, C.B.E., C.I., Sibbertoft Manor, Market Harborough, Leicestershire.

STERN, Major F. C., O.B.E., M.C., F.L.S., 16 Montagu Square, W. 1.

STOKER, Dr. FRED, F.L.S., The Summit, Golding's Hill, Loughton, Essex.

STRATHCONA AND MOUNT ROYAL, Lord, 14 South Audley Street, W. 1.

WALLACE, R. W., J.P., V.M.H., The Old Gardens, Tunbridge Wells, Kent.

WILDING, E. H., Wexham Place, Stoke Poges, Bucks.

WILLIAMS, C., M.P., 59 Tufton Street, Westminster, S.W. 1.

NOTE.—Members of the Council are Members of this Committee.

The Committee will meet :

at 12.30 P.M. on the first day of all Fortnightly Meetings ; at 11.45 A.M. on Tuesday, May 25, at Chelsea ; and at 12.30 P.M. at the Great Autumn Show at the National Hall, Olympia, on Wednesday, September 29.

Entries must be handed to the Secretary of the Committee by 10.15 A.M. at Chelsea and by 11.45 A.M. on all other occasions when the Committee meets.

The number of specimens required varies according to the heading under which an award is sought : for an award as a plant for bedding, at least one plant must be shown ; for an award as a plant for the herbaceous border or as a

plant for the water garden, a growing plant is required wherever practicable, but cut specimens, if sufficient, are admissible when the habit of the plant is well known; for an award as a plant for cutting, at least sufficient cut material to fill a vase must be shown.

No award, except Preliminary Commendation, is recommended in London to plants which can be, and usually are, raised each year from seed and flowered within a year from the sowing of the seed; and no award, except Preliminary Commendation, is recommended independently in London to plants which are usually perpetuated by seed if the class to which they belong is under trial at Wisley, has been tried in the previous year, or is on the Trials Calendar for the ensuing year. All plants which receive Preliminary Commendations under this regulation will be selected for trial at Wisley. Awards to plants commonly grown from seed each year are given to the strain and not to individual plants.

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ORCHID COMMITTEE FOR 1937.

The Orchid Committee deals with all Orchids, except hardy terrestrial species, for which see Floral Committee B.

CHAIRMAN.

COLMAN, Sir JEREMIAH, Bt., M.A., D.L., J.P., V.M.H., Gatton Park, Reigate, Surrey.

VICE-CHAIRMEN.

CLARKE, Col. STEPHENSON R., C.B., J.P., LL.D., V.M.H., Borde Hill, Haywards Heath, Sussex.

HANBURY, F. J., F.L.S., F.R.E.S., V.M.H., Brockhurst, East Grinstead, Sussex.

ROTHSCHILD, LIONEL DE, O.B.E., V.M.H., 18 Kensington Palace Gardens, W. 8.

WILSON, GURNEY, F.L.S., c/o R.H.S. Offices. (*Secretary.*)

ALEXANDER, H. G., V.M.H., Woodlands, Westonbirt, Tetbury, Glos.

ARMSTRONG, T., Orchidhurst, Sandhurst Park, Tunbridge Wells, Kent.

ASHTON, E. R., Broadlands, Camden Park, Tunbridge Wells, Kent.

COOKSON, CLIVE, Crescent House, Newcastle-upon-Tyne, 1.

CURTIS, C. H., F.L.S., V.M.H., 24 Boston Road, Brentford, Middlesex.

DYE, A., Tring Park Gardens, Tring, Herts.

ELLWOOD, A. G., c/o Charlesworth & Co., Ltd., Haywards Heath, Sussex.

FARMER, R. E., Orchid Dept., Dell Park, Englefield Green, Surrey.

FLORY, SYDNEY W., Orchid Nursery, Slough, Bucks.

HATCHER, W. H., Cragg Wood Nurseries, Rawdon, Leeds, Yorks.

HOLMES, Mrs. MARGOT A., 56 Avenue Road, Regent's Park, N.W. 8.

HURST, C. C., Sc.D., Ph.D., F.L.S., D.L., J.P., 50 Knighton Drive, Leicester.

JAMES, The Hon. ROBERT, St. Nicholas, Richmond, Yorks.

LAWSON, HENRY P., Lynbrook, Knaphill, Woking, Surrey.

LOW, STUART H., Bush Hill Park, Enfield, Middlesex.

MCBEAN, A. A., Cooksbridge, Sussex.

MERRY, A., The Gardens, The Boxes, Pevensey Bay, near Eastbourne, Sussex.

MOORE, Dr. F. CRAVEN, Duckyls, near East Grinstead, Sussex.

MOORE, Sir FREDERICK W., M.A., F.L.S., V.M.H., Willbrook House, Rathfarnham, co. Dublin.

SANDER, FREDERICK K., The Camp, St. Albans, Herts.

WILSON, E. K., Cannizaro, Wimbledon, S.W. 19.

NOTE.—Members of the Council are Members of this Committee.

The Committee will meet :

at 11.45 A.M. on the first day of all Fortnightly Meetings; at 11.45 A.M. on Tuesday, May 25, at Chelsea; and at 11.45 A.M. at the Great Autumn Show at the National Hall, Olympia, on September 29.

Entries at the Chelsea Show must be handed to the Secretary of the Committee by 10.15 A.M. and on all other days when the Committee meets by 10.30 A.M.

Usually a growing plant is required, but when the plant would have to be sent from abroad, or from such a great distance that its transport would be an unreasonable burden for the exhibitor, the Committee may regard a cut spike as sufficient.

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NARCISSUS AND TULIP COMMITTEE FOR 1937.

CHAIRMAN.

BOWLES, E. A., M.A., F.L.S., F.R.E.S., V.M.H., Myddelton House, Waltham Cross, Herts.

VICE-CHAIRMEN.

CRANFIELD, W. B., F.L.S., V.M.H., East Lodge, Enfield Chase, Middlesex.

LEAK, G. W., V.M.H., Flint House, Lynn Road, Wisbech, Cambs.

MONRO, GEORGE, C.B.E., V.M.H., 4 Tavistock Street, Covent Garden, W.C. 2.

SIMMONDS, A., N.D.H., R.H.S. Offices. (*Secretary.*)

ARKWRIGHT, Sir JOHN S., D.L., J.P., Kinsham Court, Presteign, Radnorshire.

BARR, HERBERT R., c/o Barr & Sons, 11/13 King Street, Covent Garden, W.C. 2.

BERKELEY, R. G., Spetchley Park, Worcester.

BRODIE OF BRODIE, Mrs., O.B.E., Brodie Castle, Forbes, N.B.

COBLEY, R. SEYMOUR, 4 Bridgeland Street, Bideford, N. Devon.

COPELAND, W. F. M., West View, 156 St. James Road, Southampton.

COWEN, A., c/o J. R. Pearson & Sons, Ltd., Lowdham, Notts.

CURTIS, C. H., F.L.S., V.M.H., 24 Boston Road, Brentford, Middlesex.

DARNLEY, The Earl of, Cobham Hall, Cobham, Kent.

FITZHERBERT, Sir WILLIAM, Bt., Tissington Hall, Ashbourne, Derbyshire.

HALL, Sir DANIEL, K.C.B., LL.D., D.Sc., F.R.S., V.M.H., John Innes Horticultural Institution, Mostyn Road, Merton Park, S.W. 19.

HAWKER, Capt. H. G., M.A., Strode, Ermington, S. Devon.

JOHNSTONE, G. H., Trewithen, Grampound Road, Cornwall.

MEYER, Rev. Canon ROLLO, The Manor House, Little Gaddesden, Berkhamsted, Herts.

POUPART, W., V.M.H., Ferndale, Rydens Road, Walton-on-Thames, Surrey.

RENDLESHAM, Lord, Bosloe, Mawnan, Falmouth, Cornwall.

RICHARDSON, J. LIONEL, Prospect House, Waterford, Ireland.

SECRETT, F. A., F.L.S., V.M.H., Holly Lodge Farm, Rydens Road, Walton-on-Thames, Surrey.

SLINGER, W., c/o Donard Nursery Co., Newcastle, co. Down, Ireland.

SMITH, H., Markden, 398 Wake Green Road, Moseley, Birmingham.

STANLEY, Lady BEATRIX, C.B.E., C.I., Sibbertoft Manor, Market Harborough, Leics.

STERN, Major F. C., O.B.E., M.C., F.L.S., 16 Montagu Square, W. 1.

TITCHMARSH, C. C., N.D.H., Barrow, Englishcombe, Bath, Somerset.

WHITE, A. W., c/o J. T. White & Sons, Ltd., Daffodil Nurseries, Spalding, Lincs.

WILLIAMS, A. M., Werrington Park, Launceston, Cornwall.

WILLIAMS, M. P., Lanarth, St. Keverne, R.S.O., Cornwall.

WILSON, GUY L., The Knockan, Broughshane, co. Antrim, Ireland.

NOTE.—Members of the Council are Members of this Committee.

The Committee will meet :

at 11 A.M. on the first day of all Fortnightly Meetings during February, March, April, and May ; at 12 NOON at the Daffodil Show on Thursday, April 15 ; and at 11 A.M. on Tuesday, May 25, at Chelsea.

Entries must be handed in to the Secretary of the Narcissus and Tulip Committee by 11 A.M. at the Daffodil Show ; by 10.15 A.M. at the Chelsea Show ; and by 10.30 A.M. on other occasions when the Committee meets.

The number of specimens required varies according to the award sought. For a Preliminary Commendation as a show daffodil, one stem is sufficient, but for an Award of Merit nine stems are required, and for a First Class Certificate eighteen. To be selected for trial at Kirton as a variety for cutting, or for trial at Kirton or Gulval as a variety for cutting from the open for market, twenty-four stems of a daffodil must be shown. In order to be selected for trial at Kirton as a daffodil for garden decoration twelve stems are sufficient. For an Award of Merit as a daffodil for cultivation in pots, pans, or bowls, two pots, pans or bowls, each with not fewer than three bulbs, must be shown, and four pots, pans or bowls are required for a First Class Certificate. Not fewer than twelve bulbs, growing in pots, bowls or boxes, must be shown in order that a daffodil may obtain any award as a variety for forcing for market. Directions regarding the

vases to be used for daffodils are given on the entry forms. Of a tulip shown as a variety for garden decoration, six stems are sufficient to obtain a Preliminary Commendation, but not fewer than twelve must be shown for an Award of Merit or a First Class Certificate. When staged as a tulip for forcing at least twelve plants must be exhibited as grown in not fewer than two pots, pans, bowls or boxes. A species or variety of a species of tulip may receive a Preliminary Commendation when only one stem is shown, but at least three stems are required for an Award of Merit or a First Class Certificate.

Trials of daffodils are carried out by the Holland County Council in co-operation with the Society at the Agricultural Institute and Experimental Station, Kirton, near Boston, Lincs. These trials are for varieties considered suitable for cutting, for cutting from the open for market or for garden decoration. Only varieties selected by the Narcissus and Tulip Committee at its meetings in London are grown in the trials at Kirton. Trials of varieties for cutting and for garden decoration are also conducted at Wisley. Trials of very early varieties considered suitable for cutting from the open for market are carried out by the Cornwall County Council in co-operation with the Society at the Experimental Station, Gulval, Penzance. Only very early varieties can be accepted for the trials at Gulval, and the Education Committee of the Cornwall County Council reserves the right to refuse any entry. Those who wish to send varieties for trial at Gulval should apply for entry forms to the County Horticultural Superintendent, County Hall, Truro. An award as a variety for cutting is usually given only after trial at Kirton or Wisley. An award as a variety for cutting from the open for market is usually given only after trial at Kirton or Gulval, but an award may be given to a variety which has been shown in London and favourably reported upon by an *ad hoc* Sub-Committee after examination of the variety whilst in bloom on the premises of the owner. An award as a variety for garden decoration is usually given to a daffodil only after trial at Kirton or Wisley, but it may be given to a tulip after examination of specimens exhibited in London.

In the interests of all concerned, it is very desirable that only registered names should be used for daffodils, and the Council appeals to all raisers, and to all who purchase stocks of new varieties, to co-operate with the Society in its efforts to prevent the confusion which must inevitably arise if names are given without regard to those already in use. As soon as it is decided that a seedling is worth naming, and while the whole of the stock is in one person's hands, the proposed name should be submitted to the Secretary. Before choosing a name for submission for registration, the latest edition of The Classified List of Daffodil Names should be consulted. A registration fee of 1s. for each name should be sent with the application for registration.

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JOINT BORDER CARNATION AND PICOTEE COMMITTEE FOR 1937.

CHAIRMAN.

BRIDGEFORD, J. M., 27 Drury Lane, Covent Garden, W.C. 2.

R.H.S. REPRESENTATIVES.

ALLWOOD, M. C., F.L.S., Wivelsfield Nurseries, Haywards Heath, Sussex.
 CHARRINGTON, E., Ice Wood Cottage, Limpsfield, Surrey.
 CHURCHER, Major GEORGE, Beckworth, Lindfield, Haywards Heath, Sussex.
 FAIRLIE, J., 17 Mayfield Road, Acton, W. 3.
 GIBSON, J. L., c/o Gibson (Cranleigh), Ltd., The Gardens, Cranleigh, Surrey.

NATIONAL CARNATION AND PICOTEE SOCIETY'S REPRESENTATIVES.

GRAY, F. E., 14 Queen's Avenue, Woodford Green, Essex.
 KEEN, J. J., 54 The Avenue, Southampton.
 KNAFTON, H. A., Rosecroft, Fairfield Road, Orpington, Kent.
 MAXFIELD, S., 198 Stone Street, Gravesend, Kent.
 MUSTOW, A. E., 10 Brinkley Road, Worcester Park, Surrey. (*Secretary, National Carnation and Picotee Society.*)
 WILKINSON, Capt. E. M., Fernbank, Denville, Havant, Hants.

The Committee will meet at the following times :

at 11.30 A.M. at the Fortnightly Meetings on July 6 and 20 ; at 3 P.M. at the National Carnation and Picotee Society's Show on July 13 ; at 11.30 A.M. on July 27 ; and on notice at such other times as is necessary to deal with entries.

Entries must be handed to the Secretary of the Committee by 11.15 A.M. on any of the named dates, but when it is desired to submit a variety for certificate in any week for which a meeting has not been arranged the completed entry-form must reach the Secretary of the Royal Horticultural Society, or the Secretary of the National Carnation and Picotee Society, by the Tuesday in the preceding week.

Of new varieties placed before the Joint Committee not fewer than two blooms must be shown. These varieties may be selected for trial at Wisley and/or receive Preliminary Commendation. For an Award of Merit not fewer than three blooms must be shown and three plants must be growing in the trials at Wisley. A First Class Certificate will be awarded only to a variety which has previously received an Award of Merit, and at least seven blooms must be shown. In all cases, whenever possible, a growing plant should also be shown.

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JOINT PERPETUAL-FLOWERING CARNATION COMMITTEE FOR 1937.

CHAIRMAN.

BRIDGEFORD, J. M., 27 Drury Lane, Covent Garden, W.C. 2.

R.H.S. REPRESENTATIVES.

ALLWOOD, M. C., F.L.S., Wivelsfield Nurseries, Haywards Heath, Sussex.

CARTER, E. R., Valhalla, Hartwood Road, Brentwood, Essex.

COOK, L. J., 7 Drapers Road, Enfield, Middlesex.

ENGELMANN, C., Carnation Grower, Saffron Walden, Essex.

INGAMELLS, D., 27 Catherine Street, Covent Garden, W.C. 2.

BRITISH CARNATION SOCIETY'S REPRESENTATIVES.

ALESWORTH, F. W., 17 Avenue Road, Isleworth, Middlesex. (*Secretary, British Carnation Society.*)

JORDON, F., V.M.H., Yewdene, Edenbridge, Kent.

MASON, L., c/o H. T. Mason, Ltd., Eton Lodge, Hampton Hill, Middlesex.

METCALFE, A. W., Rozel, Hatfield Road, St. Albans, Herts.

WALLACE, W. E., J.P., V.M.H., Poplar Farm, Eaton Bray, Dunstable, Beds.

WRIGHT, G. H., The Gardens, North Mymms Park, Hatfield, Herts.

The Committee will meet at the following times :

at 12 NOON at the British Carnation Society's Shows on April 27 and
November 23, and at such other times as is necessary to deal with
entries.

At the British Carnation Society's Shows entries must be handed to the Secretary of the Committee by 11.30 A.M. When it is desired to submit a variety for certificate at one of the Royal Horticultural Society's Fortnightly Shows, the completed entry-form must reach the Secretary of the Royal Horticultural Society or the Secretary of the British Carnation Society by the Tuesday in the preceding week.

To obtain an Award of Merit, at least three open blooms and one plant in bloom must be shown. No award will be made to a perpetual-flowering carnation until the Committee has seen it twice, once between November 1 and March 31, and once between April 1 and October 31. At least five calendar months must elapse between the dates on which a variety is exhibited. A First Class Certificate may be awarded only to a variety which has previously received an Award of Merit, and only after the Committee has inspected plants in growth between November 1 and March 31. Raisers who wish to enter a variety for a First Class Certificate must notify the Secretary of the Royal Horticultural Society, or the Secretary of the British Carnation Society, so that arrangements may be made for a visit of the Committee.

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JOINT DAHLIA COMMITTEE FOR 1937.

Deals with all Dahlias.

CHAIRMAN.

HAY, T., M.V.O., V.M.H., New Lodge, Hyde Park, W. 2.

R.H.S. REPRESENTATIVES.

COBB, A. J., The University, Reading, Berks.

CRANE, D. B., 50 Cholmeley Crescent, Cholmeley Park, Highgate, N. 6.

DRAYSON, G. F., 23 Palmerston Road, Buckhurst Hill, Essex.
 FIFE, WILLIAM, c/o Dobbie & Co., Ltd., Edinburgh, 7.
 RIDING, JAS. B., The Nurseries, Chingford, E. 4.
 STEWART, W., Royal Hospital, Chelsea, S.W. 3.

NATIONAL DAHLIA SOCIETY'S REPRESENTATIVES.

ALESWORTH, F. W., 17 Avenue Road, Isleworth, Middlesex.
 CAMPBELL, D., Park Superintendent's Office, Inner Circle, Regent's Park, N.W. 1.
 CHURCHER, Major G., Beckworth, Lindfield, Sussex.
 EMBERSON, J., Green Hayes, Lindsey Street, Epping, Essex.
 OGG, STUART, The Grove Nurseries, Swanley, Kent.
 WEST, J. T., Tower Hill, Brentwood, Essex.

The Committee will meet at the following times :

at 11.15 A.M. at the Fortnightly Meetings on August 4, 17 and 31, September 14, and October 12 ; at 12.15 P.M. at the National Dahlia Society's Show on Tuesday, September 7 ; and at 11.15 A.M. at the Great Autumn Show at the National Hall, Olympia, on Wednesday, September 29.

Entries must be handed to the Secretary of the Committee before 10.45 A.M.

On any Show-day when no meeting of the Joint Committee has been arranged, dahlias should be entered with the Secretary of Floral Committee A.

At least three open blooms must be shown. Varieties considered worthy are selected for trial at Wisley and awards are made only after trial.

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JOINT DELPHINIUM COMMITTEE FOR 1937.

CHAIRMAN.

LEAK, G. W., V.M.H., Flint House, Lynn Road, Wisbech, Cambs.

VICE-CHAIRMAN.

BOWES-LYON, The Hon. DAVID, St. Paul's Waldenbury, Hitchin, Herts.

R.H.S. REPRESENTATIVES.

CAMPBELL, D., New Lodge, Inner Circle, Regent's Park, N.W. 1.
 INGAMILLS, D., 27 Catherine Street, Covent Garden Market, W.C. 2.
 JAMES, E. R., Iwerne, London Road, Reading, Berks.
 LANGDON, C. F., V.M.H., Twerton Hill Nursery, Bath, Somerset.
 SMITH, Mrs. LINDSAY, Postford House, Chilworth, Surrey.
 STEVENSON, T., Colham Green Nurseries, Hillingdon, Middlesex.
 WELLS, BEN, Hardy Plant Nurseries, Merstham, Surrey.

BRITISH DELPHINIUM SOCIETY'S REPRESENTATIVES.

BISHOP, F. A., The Glade, Clewer Green, Windsor, Berks.
 CARLILE, T., Loddon Gardens, Twyford, Berks.
 CHAPLIN, J., c/o Chaplin Bros., Ltd., Royal Nurseries, Waltham Cross, Herts.
 DOWRA, Mrs. R. E., 31 Upper Brighton Road, Surbiton, Surrey.
 HILL, C. F., Westover, Hartington Road, Hillingdon, Middlesex.
 MACSELF, A. J., Domarin, Hamilton Road, Reading, Berks.
 PHILLIPS, G. A., c/o Hewitt & Co., Ltd., The Nurseries, Stratford-on-Avon, Warwickshire.
 ROBERTS, S. HALFORD, 85-86 New Bond Street, W. 1 | *Joint Hon. Secretaries,*
 MOIR, A. J., 3 Warwick Road, Thornton Heath, Surrey | *Delphinium Society.*

The Committee will meet at the following times :

at 11.15 A.M. at the Fortnightly Meetings on June 22 and July 6 ; at 11.15 A.M. on July 13 ; at 12.15 P.M. at the British Delphinium Society's Show on Thursday, July 1, and at 11.45 A.M. at the British Delphinium Society's Provincial Show at Alderley Edge on Saturday, July 10.

Entries must be handed to the Secretary of the Committee before 10.45 A.M.

On any Show-day, when no meeting of the Joint Committee has been arranged, Delphiniums should be entered with the Secretary of Floral Committee A.

When exhibited as a variety for show purposes, or as a variety for garden decoration, at least three spikes of flowers, either cut or on a plant or plants,

are required, and when staged as a variety for cutting, sufficient cut spikes of flowers to fill a vase must be shown.

An award as a variety for garden decoration, or as a variety for cutting, is made only after trial at Wisley. Varieties submitted to the Committee at Shows, and considered worthy, are selected for trial.

JOINT IRIS COMMITTEE FOR 1937.

CHAIRMAN.

STERN, Major F. C., O.B.E., M.C., F.L.S., 16 Montagu Square, W. 1.

VICE-CHAIRMEN.

MUSGRAVE, C. T., V.M.H., Olivers, Hascombe, Godalming, Surrey.

PILKINGTON, G. L., Lower Lee, Woolton, Liverpool.

R.H.S. REPRESENTATIVES.

BOWES-LYON, The Hon. DAVID, St. Paul's Waldenbury, Hitchin, Herts.

BOWLES, E. A., M.A., F.L.S., F.R.E.S., V.M.H., Myddelton House, Waltham Cross, Herts.

CHRISTIE-MILLER, C. W., Swyncombe House, Henley-on-Thames, Oxon.

GALSWORTHY, FRANK, Green Lane Farm, Chertsey, Surrey.

JENKINSON, Capt. R. C. H., Knap Hill Manor, near Woking, Surrey.

LAWRENCE, Lady, Riverdale, Dorking, Surrey.

MEYER, Rev. Canon ROLLO, The Manor House, Little Gaddesden, Berkhamsted, Herts.

PESEL, Miss L. F., The White House, Colebrook Street, Winchester.

WELLS, BEN, Hardy Plant Nurseries, Merstham, Surrey.

IRIS SOCIETY'S REPRESENTATIVES.

BAKER, G. P., V.M.H., Hillside, Oakhill Road, Kippington, Sevenoaks, Kent.

BARR, PETER R., V.M.H., 61 Kingsfield Road, Oxhey, Herts.

BUNYARD, G. N., F.L.S., 10 Faraday Road, Maidstone, Kent.

HELLINGS, F. WYNN, Fleur de Lis, 41 Grove Way, Esher, Surrey.

LEVETT, Mrs. G. C., 29 Crescent Road, Kingston Hill, Surrey.

MURRELL, Mrs., c/o Orpington Nursery Co., Orpington, Kent.

PERRY, AMOS, V.M.H., Hardy Plant Farm, Enfield, Middlesex.

SPENDER, R. E. S., Halshanger, Bagleywood, Oxford.

WALLACE, R. W., J.P., V.M.H., The Old Gardens, Tunbridge Wells, Kent.

YELD, G., M.A., V.M.H., Orleton, Austen Wood Common, Gerrard's Cross, Bucks.

The Committee will meet at the following times :

at 12.45 P.M. on the first day of the Fortnightly Meetings on April 6 and 20, May 4, June 8 and 22, July 6 and 20 ; and at 10.30 A.M. on Tuesday, May 25, at Chelsea.

Entries must be handed to the Secretary of the Committee by 10.15 A.M. at Chelsea and by 11.45 A.M. at all other meetings.

On any Show-day, when no meeting of the Joint Committee has been arranged, Irises should be entered with one of the Secretaries of the Floral Committees.

If an Iris is shown with a view to its being selected for trial, one flowering stem is usually sufficient, but in order to obtain an award as a plant for general garden use, as a plant for the rock garden, or as a variety for market, not fewer than three flowering stems must be shown. When entered as a plant for the alpine house an Iris must be represented by a plant or plants carrying not fewer than three flowering stems in all and growing in a pot or pan, or pots or pans. If exhibited as an ornamental pot-plant the plants must be in pots.

Awards are made to species and first crosses between species when exhibited in London. Irises of garden origin (other than first crosses between species) may receive awards when exhibited in London, if considered suitable for the rock garden, alpine house, or for cultivation as ornamental pot-plants, but those which are entered as suitable for general garden use or for market, if considered worthy, are selected for trial at Wisley, a certificate of Preliminary Commendation being the only award for which they are eligible without trial.

JOINT RHODODENDRON COMMITTEE FOR 1937.**CHAIRMAN.**

STEVENSON, J. B., Tower Court, Ascot, Berks.

VICE-CHAIRMEN.

ABERCONWAY, Lord, C.B.E., V.M.H., 38 South Street, Mayfair, W. 1.

WILDING, E. H., Wexham Place, Stoke Poges, Bucks.

R.H.S. REPRESENTATIVES.

BEAN, W. J., C.V.O., I.S.O., V.M.H., 2 Mortlake Road, Kew, Surrey.

CLARKE, Col. STEPHENSON R., C.B., J.P., LL.D., V.M.H., Borde Hill, Haywards Heath, Sussex.

COMBER, J., V.M.H., The Gardens, Nymans, Handcross, Sussex.

HAY, T., M.V.O., V.M.H., New Lodge, Hyde Park, W. 2.

JAMES, The Hon. ROBERT, St. Nicholas, Richmond, Yorks.

OLDHAM, W. R., J.P., Sherwood, Windlesham, Surrey.

PINCKNEY, G. H., c/o John Waterer, Sons & Crisp, Ltd., The Floral Mile, Twyford, Berks.

REUTHE, G., Sunnycroft, 109 Crown Lane, Bromley, Kent.

WALLACE, R. W., J.P., V.M.H., The Old Gardens, Tunbridge Wells, Kent.

WILLIAMS, C., M.P., 59 Tufton Street, Westminster, S.W. 1.

RHODODENDRON ASSOCIATION'S REPRESENTATIVES.

CROSFIELD, J. J., Embley Park, Romsey, Hants.

GODMAN, Dame ALICE, D.B.E., South Lodge, Horsham, Sussex.

HUTCHINSON, J., LL.D., F.L.S., The Herbarium, Royal Botanic Gardens, Kew, Surrey.

JENKINSON, Capt. R. C. H., Knap Hill Manor, near Woking, Surrey.

LODER, Lady, Leonardslee, Horsham, Sussex.

LODER, Lt.-Col. GILES, H., M.C., High Beeches, Handcross, Sussex.

ROSE, F. J., Townhill Park Gardens, West End, Southampton.

ROTHSCHILD, LIONEL DE, O.B.E., V.M.H., 18 Kensington Palace Gardens, W. 8.

SLOCOCK, O. C. A., Goldsworth Old Nursery, Woking, Surrey.

STRATHCONA AND MOUNT ROYAL, Lord, 14 South Audley Street, W. 1.

WALKER-HENEAGE-VIVIAN, Admiral A., C.B., M.V.O., D.L., Clyne Castle, Blackpill, Swansea, Glamorgan.

WILSON, GURNEY, F.L.S., c/o R.H.S. Offices. (Secretary, Rhododendron Association.)

The Committee will meet at the following times :

at 11.15 A.M. at the Fortnightly Meetings on March 9 and 23, April 6 and 20, May 4, June 8 and 22 ; and at 11 A.M. on Tuesday, May 25, at Chelsea.

Entries at the Chelsea Show must be handed to the Secretary of the Committee by 10.15 A.M. ; at other meetings by 10.45 A.M.

On any Show-day, when no meeting of the Joint Committee has been arranged, rhododendrons should be entered with the Secretary of Floral Committee B.

When shown as a plant for general garden use or as a plant for the greenhouse, a cut spray or truss is usually sufficient, but if possible a plant should be shown. At least one plant is required when a rhododendron is shown as suitable for the rock garden or alpine house, and in the latter case the plant must be growing in a pot or pan.

Trials of selected garden forms of azaleas, and of hardy hybrid rhododendrons, including azaleas, raised by nurserymen, other than the results of first crosses made between species, are carried out at Exbury, and awards to these plants are made only after trial. All other rhododendron hybrids, as well as all species, are eligible for awards when exhibited in London.

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JOINT ROCK-GARDEN PLANT COMMITTEE FOR 1937.

The Joint Rock-Garden Plant Committee deals with all plants for the rock-garden or alpine house.

CHAIRMAN.

STERN, Major F. C., O.B.E., M.C., F.L.S., 16 Montagu Square, W. 1.

VICE-CHAIRMEN.

BOWES-LYON, The Hon. DAVID, St. Paul's Waldenbury, Hitchin, Herts.
BYNG OF VIMY, The Viscountess, Thorpe Hall, Thorpe-le-Soken, Essex.
MUSGRAVE, C. T., V.M.H., Olivers, Hascombe, Godalming, Surrey.
STOKER, Dr. FRED, F.L.S., The Summit, Golding's Hill, Loughton, Essex.

R.H.S. REPRESENTATIVES.

BOWLES, E. A., M.A., F.L.S., F.R.E.S., V.M.H., Myddelton House, Waltham Cross, Herts.
ELLIOTT, CLARENCE, Six Hills Nursery, Stevenage, Herts.
FENWICK, MARK, J.P., Abbotswood, Stow-on-the-Wold, Gloucestershire.
LAWRENCE, Lady, Riverdale, Dorking, Surrey.
PERRY, AMOS, V.M.H., Hardy Plant Farm, Enfield, Middlesex.
PRESTON, F. G., University Botanic Garden, Cambridge.

ALPINE GARDEN SOCIETY'S REPRESENTATIVES.

ANDERSON, E. B., Russetings, Loudwater, Rickmansworth, Herts.
BAKER, G. P., V.M.H., Hillside, Oakhill Road, Kippington, Sevenoaks, Kent.
GUSEPPI, Dr. P. L., Trevoze, Felixstowe, Suffolk.
INGWERSEN, W. E. TH., Birch Farm Hardy Plant Nursery, Gravetye, East Grinstead, Sussex.
PULHAM, J. R., 71 Newman Street, W. 1. (*Secretary, Alpine Garden Society.*)
REUTHE, G., Sunnycroft, 109 Crown Lane, Bromley, Kent.
ROSENHEIM, PAUL, 27 Spencer Road, East Molesey, Surrey.

The Committee will meet at the following times :

at 12 NOON on the first day of all Fortnightly Meetings ; at 11 A.M. at Chelsea on Tuesday, May 25 ; at 12 NOON at the Alpine Garden Society's Autumn Show on Tuesday, September 7 ; and at 12 NOON at the Great Autumn Show at the National Hall, Olympia, on Wednesday, September 29.

Entries must be handed to the Secretary of the Committee by 10.15 A.M. at Chelsea and by 11.30 A.M. on all other occasions when the Committee meets.

At least one plant must be shown, and for an award as an alpine house plant the plant must be growing in a pot or pan.

JOINT SWEET PEA COMMITTEE FOR 1937.

CHAIRMAN.

LEAK, G. W., V.M.H., Flint House, Wisbech, Cambs.

R.H.S. REPRESENTATIVES.

ALLAN, D., c/o Dobbie's Seed Farms, Marks Tey, Essex.
BRIDGEFORD, J. M., 27 Drury Lane, Covent Garden, W.C. 2.
CAMPBELL, D., New Lodge, Inner Circle, Regent's Park, N.W. 1.
CRANE, D. B., 50 Cholmeley Crescent, Cholmeley Park, Highgate, N. 6.
DAWKINS, A., c/o Alfred Dawkins (Chelsea), Ltd., 408 King's Road, Chelsea, S.W. 10.
METCALFE, A. W., Rozel, Hatfield Road, St. Albans, Herts.
WILSON, J., The Gardens, Trent Park, New Barnet, Herts.

NATIONAL SWEET PEA SOCIETY'S REPRESENTATIVES.

BARTLETT, A. C., 19 Bedford Chambers, W.C. 2. (*Secretary, National Sweet Pea Society.*)
BOLTON, T., c/o R. Bolton & Son., Birdbrook, Essex.
BURT, G. H., Grange Hill, Coggeshall, Essex.
GOWER, A. W., Calcot Grange Gardens, Reading, Berks.
JANES, E. R., Iwerne, London Road, Reading, Berks.
RUNDLE, C. H., Barton Court Gardens, Canterbury, Kent.
STEVENSON, J., Poole Road, Wimborne, Dorset.
TOLMAN, G. H., The Manor Gardens, Northwood, Middlesex.

The Committee will meet at the trials at Wisley on receipt of notice.

JOINT COMMITTEE FOR COMMERCIAL FRUIT TRIALS FOR 1937.**CHAIRMAN.**

HALL, SIR DANIEL, K.C.B., F.R.S., D.Sc., LL.D., V.M.H., John Innes Horticultural Institution, Mostyn Road, Merton Park, S.W. 19.

R.H.S. REPRESENTATIVES.

BEAR, E. M., Fruit Farm, Magham Down, Hailsham, Sussex.
 BUNYARD, E. A., F.L.S., Allington, Maidstone, Kent.
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 1897 MARIES, CHARLES, F.L.S. (d. 1902).
 1906 MARSHALL, WILLIAM, F.E.S. (d. 1917).
 1902 MASSEE, GEORGE, F.L.S. (d. 1917).
 1904 MAWLEY, EDWARD, F.R.M.S. (d. 1916).
 1910 MAY, HENRY B. (d. 1936).
 1927 MILLAR, J. G. (d. 1931).
 1897 MILLNER, HENRY ERNEST, F.L.S. (d. 1906).
 1897 MOLYNEUX, EDWIN (d. 1921).
 1897 MONRO GEORGE (d. 1920).
 1925 MOORE, G. F. (d. 1927).
 1897 MORRIS, Sir DANIEL, K.C.M.G. (d. 1933).
 1924 MORRIS, SYDNEY (d. 1924).
 1925 MOUNT, GEORGE (d. 1927).
 1897 NICHOLSON, GEORGE, F.L.S. (d. 1908).
 1901 NORMAN, GEORGE (d. 1906).
 1897 O'BRIEN, JAMES (d. 1930).
 1901 ORMEROD, Miss E. A., LL.D. (d. 1901).
 1897 PAUL, GEORGE, J.P. (d. 1921).
 1897 PAUL, WILLIAM, F.L.S. (d. 1905).
 1911 PEARSON, ALFRED H., J.P. (d. 1930).
 1924 PEARSON, CHARLES E. (d. 1929).
 1914 PINWILL, Capt. W. (d. 1926).
 1904 REDESDALE, Lord, G.C.V.O., C.B. (d. 1916).
 1897 RIVERS, T. FRANCIS (d. 1899).
 1925 ROCHEFORD, J. (d. 1932).
 1921 ROLFE, R. A., A.L.S. (d. 1921).
 1917 ROLLIT, Sir A. K., D.C.L., LL.D. (d. 1922).
 1908 ROSS, CHARLES (d. 1917).
 1897 SANDER, FREDERICK, F.L.S. (d. 1920).
 1897 SCHROEDER, Baron Sir HENRY, Bt., C.V.O. (d. 1910).
 1897 SEDEN, JOHN (d. 1920).
 1897 SHERWOOD, N. N. (d. 1916).
 1916 SLOCOCK, W. C. (d. 1926).
 1897 SMITH, JAMES (d. 1903).
 1897 SMITH, MARTIN R. (d. 1908).
 1906 SMITH, THOMAS (d. 1919).
 1897 SPEED, WALTER (d. 1921).
 1927 STAFF, Dr. O., F.R.S., F.L.S. (d. 1933).
 1897 SUTTON, A. W., J.P., F.L.S. (d. 1925).
 1901 SWEET, JAMES (d. 1924).
 1926 THEOBALD, Prof. F. V., M.A., F.E.S. (d. 1930).
 1897 THOMAS, OWEN (d. 1923).
 1897 THOMPSON, WILLIAM (d. 1903).
 1897 THOMSON, DAVID (d. 1909).
 1897 TURNER, HARRY (d. 1906).
 1906 VEITCH, Sir HARRY J., F.L.S. (d. 1924).
 1916 VEITCH, P. C. M., J.P. (d. 1929).
 1936 WAKEHURST, Lord, F.L.S. (d. 1936).
 1916 WATSON, W., A.L.S. (d. 1925).
 1927 WHITE, J. T. (d. 1930).
 1912 WHITTON, J. (d. 1925).
 1914 WHYTOCK, JAMES (d. 1926).
 1912 WILES, Rev. WILLIAM, M.A. (d. 1923).
 1927 WILLIAMS, P. D. (d. 1935).
 1897 WILLMOTT, Miss E., F.L.S. (d. 1934).
 1912 WILSON, Dr. E. H., M.A. (d. 1930).
 1897 WILSON, G. F., F.R.S., F.L.S. (d. 1902).
 1897 WOLLEY-DOD, Rev. C., M.A. (d. 1904).
 1897 WRIGHT, JOHN (d. 1916).
 1920 WRIGHT, SAMUEL T. (d. 1925).
 1897 WYTHES, GEORGE (d. 1916).

INDEX.

- Affiliated Societies, 12
 Cup, 30
 Annual Meeting, 2, 8
 Associates, 9
 of Honour, 9, 11, 12
 Autumn Show, 5, 6
 Awards, 28

 Banksian Medal, 29
 Bequests, 17
 Botanical Certificate, 28
 British Floral Art Diploma, 27, 54

 Cactus trophy, 32
 Cain Cup, 30
 Calendar, 1937, 1
 Carnation, Border, Joint Committee,
 47
 Perpetual-flowering, Joint Com-
 mittee, 48
 Certificates, 28
 Charter, 8
 Chelsea Show, 1, 3, 4, 17
 Chemical Analysis privileges, 16
 Clay Cup, 30
 Committees and their work, 36, 40
 Coronation Cup, 30
 Council and Officers, 7, 8
 Cups for Award, 30-32
 Cymbidium Trophy, 31
 Cypripedium Trophy, 31

 Daffodil Cup, 31
 Show, 3
 Dahlia Joint Committee, 48
 Delphinium Joint Committee, 49
 Distribution of plants, 25, 26

 Engleheart Cup, 30
 Examinations, 26, 27
 Board, 53
 Exhibition Committee, 53
 Exhibitions, general arrangements, 33

 Fellowship, 9
 Honorary, 9, 10
 Flora Medal, 29
 Floral Committee A, 42
 B, 44
 Foremarke Cup, 30
 Fruit and Vegetable Committee, 41
 Show, 6
 Commercial trials, 25, 53

 Gardens, Advisory Committee, 54
 the Society's, 19, 23
 admission to, 20
 to reach, 21, 22, 24
 trials, 20, 24, 25
 George Monro Cup, 31
 George Moore Medal, 29
 Gold Medal, 29
 Gordon-Lennox Cup, 31
 Grenfell Medal, 29

 Hall lettings, 17
 Hogg Medal, 29
 Holford Medal, 29

 Identification of plants, etc., 18
 Information, 17
 Inspection of Gardens, 18
 Iris Group, 14
 Joint Committee, 50

 Jones-Bateman Cup, 32

 Knightian Medal, 29

 Lawrence Medal, 28
 Lectures, 1-6, 13
 Letting of Halls, etc., 17
 Library, 14
 catalogue, 16
 Committee, 55
 Lily Group, 13, 55, 56
 Discussions, 4, 6
 Lindley Medal, 29
 Loder Cup, 32

 Medals, 28, 29, 30
 Meetings in 1937, 1-6, 13

 Naming of plants, 38
 Narcissus and Tulip Committee, 46
 National Diploma in Horticulture, 26

 Odontoglossum Trophy, 32
 Orchid Committee, 45
 cups and trophies, 31, 32

 Patrons, 1936, 7
 P. D. Williams Medal, 29
 Peter Barr Memorial Cup, 32

Pictures, etc., at Shows, 34
Plant and seed distribution, 25, 26
names, 38
Publications, 16
Committee, 55

Reginald Cory Cup, 31
Rhododendron Joint Committee, 51
Riddell Trophy, 32
Rock-Garden Plant, Joint Committee,
51

Sales at Shows, 19, 33, 35
Sander Medal, 29
Scientific Committee, 40
Sewell Medal, 29
Sherwood Cup, 31
Shows, 1-6
kindred Societies', 1-6, 17

Sundries at Shows, 13, 34, 35
Sutton Vegetable Cups, 32
Sweet Pea Joint Committee, 52

Tickets and their use, 16
gardeners', 17
Trials, 20, 24, 25

Vegetable Cups, 31, 32
Veitch Memorial Medal, 30
Victoria Medal of Honour, 57, 58

Wigan Cup, 31
Williams Memorial Medal, 29
Wisley Gardens, 19
Work of Society, 8

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THE POTATO IN ITS EARLY HOME AND ITS
INTRODUCTION INTO EUROPE.

By REDCLIFFE N. SALAMAN, M.D., F.R.S.

[Read October 27, 1936 ; Chairman, Sir A. D. HALL, F.R.S. ; and
November 10, 1936, Chairman, Sir WM. LOBJOIT, O.B.E.]

OF all the new plants which the discoveries of COLUMBUS introduced to the Old World, none has played so important a part in the subsequent history of mankind as has the potato.

The tale of its origin has been told many times : DE CANDOLLE's account in his *Origin of Cultivated Plants*, written in 1882, though valuable, pales before ROZE's magnificent classic, *La Histoire de la Pomme de Terre*, published in 1898, which may be taken as representing the general state of knowledge not only at that date but up till about 1925. It was then that SAFFORD* wrote an illuminating article in which he brought forward new evidence as to the antiquity of potato cultivation in Peru in the pre-Spanish period. Not less valuable was the faithful manner in which he dealt with the problem of its introduction into Europe and, in particular, the legends surrounding the names of DRAKE, HAWKINS and RALEIGH. To him also belongs the credit of disposing once and for all of the myth created by GERARD, of Herbal fame, that the potato was a native derived of Virginia.

Since SAFFORD's work no important new historical studies have been published, but the subject of the origin of the domestic potato

* SAFFORD, W. E. "The Potato of Romance and Reality," *Journal of Heredity*, vol. xvi, pp. 113-230 (1925).

has been attacked on a very wide front from other angles, viz. that of the systematic botanist and the geneticist. In this, Russian scientists have played a foremost part and to their work I shall refer directly.

Extensive work on the taxonomy of the wild tuber-bearing *Solanums* by BAKER, BERTHAULT, WIGHT, and on the genetics of the potato domestic and wild, by the writer and others, had been carried out between 1906 and 1930 but nothing comparable in magnitude with the work of the Russian Expeditions had so far been attempted, nor can the stimulus which it has given to potato cultivation be exaggerated. In these lectures the subject has been approached from a rather different angle, viz. the archaeological and the psychological. At first sight it may appear fantastic to talk of psychology in relation to a vegetable, but it is a fact that the psychology of those who first made use of it materially affected the early phases of its cultivation.

In general, the varying reactions of a living organism, plant or animal, to its environment, considered in relation to the capacity of man to make use of it in his struggle for existence, creates a psychological field the exploration of which varies in interest with the intensity of the struggle.

It is hardly necessary to say much about the material importance of the potato in the social economy of the people of the western world and the United States. It is heartening, however, to realize that the value of the world potato crop for any one year far exceeds all the accumulated treasure of gold and silver which was squeezed out of the Inca Empire in the first thirty years or so of Spanish rule. The Conquest of the Inca and the Spanish occupation of South America is a chequered tale, woven of romance and courage on the one hand and of almost unthinkable cruelty and stupidity on the other. It would be hard indeed for a "Martian" to draw a balance between the good and evil consequences of that great adventure. In regard to much of South America to-day, it would be difficult to deny that the Conquest was other than a misfortune from the standpoint of the native, and but a doubtful blessing from that of the conquering race. In the old world, now that the pomp and circumstance of those great days have passed, and their golden treasure is dissipated, it is the humble potato which presents the most enduring and the least equivocal testimony both to the intelligence of the conquered and the adventurous faith of the conqueror. Conceived by the mighty Andes, the potato has proved itself no "ridiculous mouse" in the hands of its foster-parents.

Botanically, the potato is one of the great family of the *Solanums*, finding its place in the *Hyperbathrum* group of the section *Tuberosum*. This group, which is made up of several smaller ones, contains all the species of potatoes known.

Of late years our botanical knowledge of the potato has been greatly increased by the work of the Russian savants, VAVILOV, BUKASOV, and their colleagues, who conducted three expeditions of botanical exploration between 1926 and 1932. They have shown that there are some thirteen different and distinct species of tuber-bearing

Solanums, and that several of these have been cultivated from earliest times by the natives in different parts of the South American continent. They have demonstrated that the potato varieties of Europe, of the United States, and indeed the great majority of those cultivated in Peru, Bolivia and Chile, all belong to one group which they designate a collective species.

The Russian workers have gone beyond this : they have produced good evidence for the view that the potato not only flourished in South America, but that it developed its remarkable variability in two areas or foci on that continent. One focus they place in the Bolivian and North Peruvian Andine plateaus, the other in the island of Chiloe and the neighbouring mainland of Chile. The environmental character of these two foci of differentiation and dispersion differ widely, the one lying in the high altitudes of the Cordillera, within 20 degrees of the Equator, where the days are short, soil is poor, and rain often scanty ; the other in the temperate regions of Chile, where the days during the growing season are long, the soil rich, and the rainfall excessive. The Russian investigators have attempted to draw a definite botanical distinction between varieties originating in these two areas, which they base on a study of the finer taxonomic details exhibited by the plants from either area in the large collections of potatoes, wild and cultivated, which they have made.

The Russians, having satisfied themselves as to the validity of this cleavage, have conferred distinctive names on the two potato groups or sub-species. The Bolivia-Peruvian they call *Solanum andigenum* ; the Chilean, *S. tuberosum*. They are, however, careful to point out that both groups are freely inter-fertile, which indeed might be expected from the identity of their chromosome formula, viz. $2n = 48$.

The relationship of our domestic potato varieties with the two collective groups at once becomes a question of much interest, and one on which the Russian investigators have pronounced unequivocally, namely, that our common domestic potato and the *S. tuberosum* of Chile are identical. From this point in the analysis of the problem the next step was but logical ; if the European potato, and in that term must be included the common Irish potato wherever grown, is identical with the Chilean *S. tuberosum*, then it follows that the potato which reached Europe towards the end of the sixteenth century must have been derived from Chile and not from Peru. Hence the Russians dismiss with a gesture as valueless saga all arguments which would attempt to link the origin of the potato with the land of the Inca.

How the potato was conveyed from Chile to Europe they do not tell us, but they do solemnly warn us that in view of their discoveries such tales as would give the credit of its introduction into Europe to the HAWKINS, to DRAKE, or to RALEIGH may be dismissed as fairy tales.

If one ventures to disagree with some of the conclusions which the Russians have drawn from their work, it must not be regarded as minimizing one's admiration of their very important contribution to

the elucidation of a problem which is as intricate as it is intriguing. Indeed the question of origins is but a part, and perhaps the least important, of the results attained. The discovery of frost and blight-resistant species,* some having different chromosome formulæ and belonging neither to the *S. andigenum* nor the *S. tuberosum* group, far outweighs the more academic and controversial issues we are considering at the moment.

We have reason to believe that the valuable physiological properties referred to may be brought by appropriate Mendelian methods of breeding into the composition of our domestic plant, and to that aspect of the subject I hope to return on some other occasion.

Just as it is impossible to discuss intelligently the history of the potato without reference to those early agriculturists who won and fashioned it, so would it be but a vain task were we to leave undescribed the peculiar setting in which both plant and man evolved their mutual understanding. For the early history of the potato was set on a stage whose mysterious grandeur could never have been absent from the thought and actions of the men who, thousands of years before the coming of COLUMBUS, won for all mankind this and other priceless gifts from Nature's storehouse.

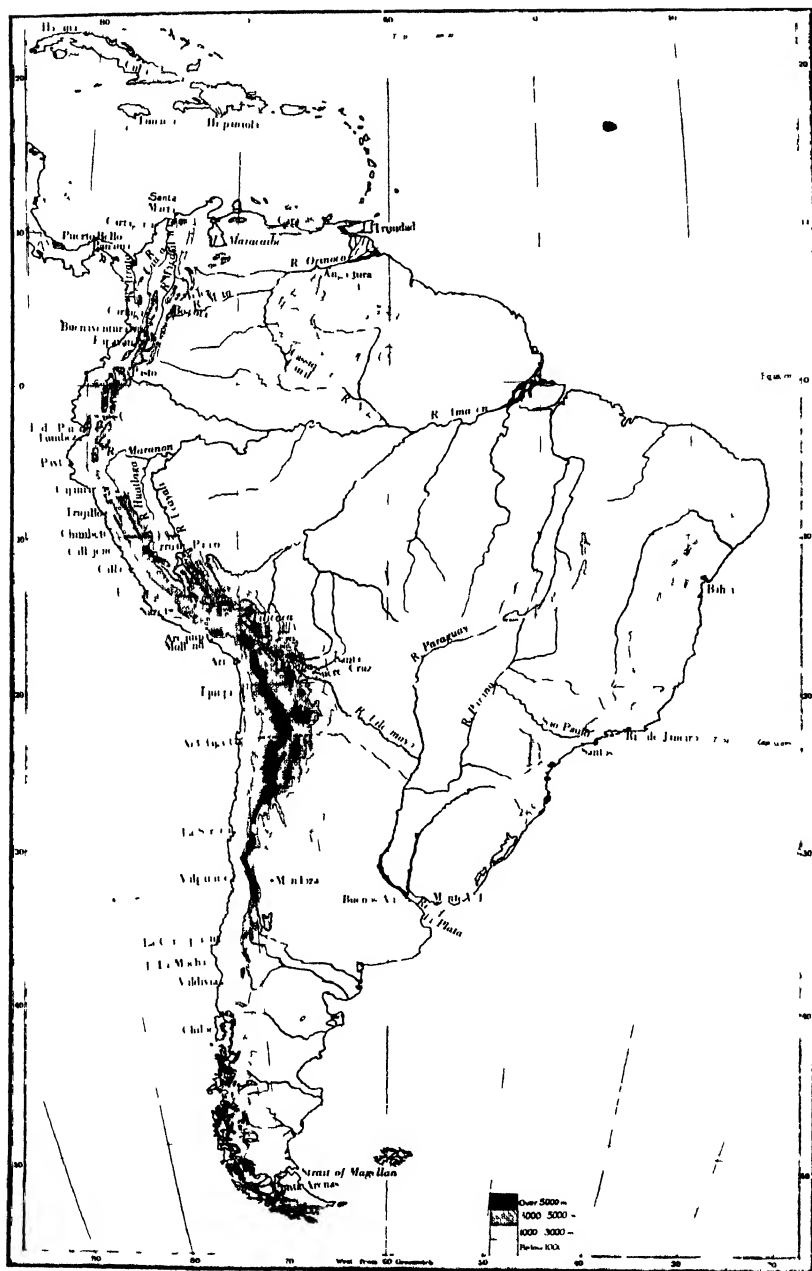
The problem is confined geographically to the continent of South America by the fact that nowhere in Central or North America was the potato cultivated in pre-Columbian times. This is the more curious when we realize that as far north as Colorado various species of wild tuber-bearing *Solanums* are to be found.

Mexico, in particular, is so rich in such plants that VAVILOV regards it as a definite focus of differentiation and dispersion. The tubers of some of these wild plants are at times eaten by the natives, but apparently never cultivated. The same is reported from Guatemala. When later the potato gained an entry into Mexico after the conquest, it was the Peru-Bolivian potato which was imported. It seems possible that the people of these parts, especially in Mexico, were on the point of developing an independent culture of the potato when the entry of the Spanish destroyed their civilization.

In South America the immigrant peoples found a large variety of wild potatoes, but in contrast to those of North and Central America they brought them into cultivation at an early stage of their settlement, possibly two thousand years or more before the Spanish conquest. Why people of the same original race should have behaved so differently on either side of the Equator is a problem the solution of which is almost certainly to be found in the extraordinary geographical and climatic conditions of the area into which the settlers penetrated.

In the warm regions of Mexico and Central America, the cereal maize, so easily grown and so bounteous in its returns, contended with the mandioca root for the first place in Nature's bounty. On the high tablelands of inner Colombia, Ecuador and Bolivia, where

* The author recorded the inheritance of immunity to *Phytophthora* in a wild species in 1909.



mandioca is wanting and maize begins to fail, successive immigrant waves, searching for a staple food, eventually found it in the wild potato. These high altitudes, by reason of their isolation and their freedom from malaria and the diseases of the jungle, afforded a permanent home in which the immigrants attained at one time a level of culture only a little below that reached on the Peruvian coast.

Of the vast continental mass of South America it is only the western border which concerns us to-day—that part whose physical character is dominated by the mountain chain which stretches in a north-south direction from the eastern end of the Isthmus of Panama along the whole coast to the Straits of Magellan.

The Andean range is folded along its length in such a manner that from the Equator northwards it is broken up into a fan-shaped structure of three divergent ridges with intervening valleys and plateaus which, uniting at the Equator, continue south of it as a double chain as far as Pasco (lat. 11° S.), only to diverge again into three parallel chains which converge on one another at Villacanota (lat. 14° S.). Once more the range splits into two, between whose arms are held the great upland seas of Lake Titicaca and Lake Aullagas, more generally known as Lake Poopo, and the lofty plains of the Collao of Bolivia. The chain remains bifid until lat. 30° S., when it continues southward as a single ridge throughout the length of Chile, to fade out in Patagonia and the islands north of Cape Horn.

Although the main directions of the Cordilleras are north-south, they are buttressed along their length by mountain spurs running east to west; those on the west shepherd the scanty waters which fall on this side of the range to the valleys which open on to the coast; those on the east, far more richly endowed, conduct their waters in ever bigger streams which ultimately join the Amazon and lose themselves in the Atlantic Ocean. The peculiar formation of this mighty range, which extends from north to south some four thousand miles, dominates not only the climate of the continent, the nature of its fauna and flora, but, above all, the character of its human occupants and their cultures.

The fact that a great portion of the land we are discussing lies in the tropics and its neighbourhood, has not so important an influence on the variety of climate, as have the dazzling contrasts of altitude and humidity to be found at almost any latitude between areas lying but a relatively small distance apart in an east to west direction.

This becomes evident when we consider the variation of climate and geographical conditions along a line running west to east at a latitude of about 8° S. On the Pacific coast is a rainless desert leading to arid foothills and thence upwards to steep valleys, which at a height of about 10,000 feet enjoy a moderate rainfall, and the line then passes between mountains attaining a height of some 20,000 feet to plateaus of 12,000 to 14,000 feet, intersected towards the east by deep cañons, where conditions are more or less tropical, such as that of the river Marañon, which drains eventually into the Amazon. Further

eastward are more high plateaus passing into the central range of the Cordillera, on the eastern side of which through lofty passes are met again plateaus and river cañons like that of the Huallaga, dividing the central from the eastern range. To the east of this last the descent is rapid, through well-watered valleys in which tropical vegetation begins at an altitude of about 6,000 feet, and which lead down into the great rain forests of the Amazon basin.

If man's material and psychological experience within a specific environment influences the structure of the society he builds, moulding the character, and colouring the reactions of the individuals who compose it, a thesis which to-day is not likely to be seriously disputed, then it is a matter of no small importance to determine how and from what direction the original immigrant natives reached the area we are discussing. This area comprises the countries Colombia, Ecuador, Peru, most of Bolivia, and the northern part of Chile, all of which, except Colombia, were united under the Incas before the Spanish conquest.

Of the routes to the Peruvian coastlands three come under consideration: one via the Isthmus of Panama and down the north-west coast of Colombia and Ecuador, another via the Magdalena or from some point on the north coast of Venezuela, and a third by migration up the great rivers debauching on the east coast. The first may be excluded as the dense rain-forests and broken country of these regions have proved an impenetrable barrier even to modern man, whilst penetration by the second route, though quite possible, would afford a field of experience not materially different from that derived by the third route, an intrusion via the Orinoco and Amazon river systems.

The importance of the question is apparent when we consider the dramatic contrast between the environment afforded by the rain forest of the Amazon and that of the desert coast of Peru, one or other of which must have played the part of nursery to the people. If man came from the west via the sea, then he would have known nothing of the jaguar or the boa, the potato or the coca plant, till he encountered them as he penetrated eastward. In which case we should not expect that the dread of the former and the use of the latter would be already characteristic elements in the social system of the coast at the earliest archæological date as, in fact, they are. The evidence would seem to point rather in the opposite direction, inducing us to accept the theory of such eminent Americanists as TELLO* that man reached the Peruvian area from the east. The writer, indeed, without any pretence to expert archæological knowledge, reached a similar conclusion independently, from a study of the pottery of the coastal cemeteries, in the attempt to unravel the history of the potato. This point of view, whether right or wrong, is to no small degree subjective, and has of necessity influenced the treatment of the problem. The only excuse that can be offered for this deflection from a strict objectivity is that without it such data as we have would seem to

* TELLO, J. *Prehistoric Peru* (1922).

have no coherence. To study a problem so intimately wrapped up with man's reactions to his surroundings without considering his psychology in relation to those surroundings, is like playing Hamlet without the Prince of Denmark.

We have numerous early Spanish accounts of expeditions into the Montana in which they describe the eastern slopes of the Andes, the Brazilian forests, and the natives they encountered. The dense, impenetrable rain-soaked jungle, a way through which had to be hacked yard by yard even for a man on foot, a still more arduous task when horses were involved, their only guide a network of rivers, the air swarming with savage insects, the land haunted by jaguar and the boa constrictor, the waters infested by alligators and voracious fishes, all create a picture which is not merely one of hardship and difficulty but one which inspired then, as it does to-day, a feeling of terror even in the hardiest explorers. They found the natives adepts in the use of poisoned arrows, invariably hostile and at war with one another. That their chief source of flesh food, other than fish and turtle, was human, added an ever-present source of dread both to the Spaniards and their native followers from the Sierra, no less than to the forest tribes themselves.

In general, the natives of the forest were well supplied with food, they made clearings in the neighbourhood of the rivers, on which they cultivated small patches of mandioca and other roots. The potato they did not know. They did not develop methods for preserving foodstuffs, as did the natives of the Sierra and the coast, for they had no necessity to insure against frosts or loss of harvest.

Whether the original native immigrants to the forest experienced the feeling of terror which the forest inspired in the Spaniard it is difficult to say, but we do know that the Djukas or African negroes who took to the bush in the seventeenth and eighteenth centuries in the Guianas, shared this feeling and restricted their settlements to clearings along the river banks.* There is abundant evidence that the native of the neighbouring Sierra shared that feeling to the full, and one can only suppose that those who left the forest regions and settled on the inhospitable mountain plateaus were driven to do so by psychological rather than material reasons.

The writer has spoken to several friends who have travelled in the great rain forests of the Amazon and finds that they were either overcome with a feeling of terror or succumbed to a complete boredom.

The native South American is above all an animist; he sees in every object of Nature, whether living or not, some spirit. Rivers flowed, trees grew, the sun ruled by day and the moon by night, by reason of the spiritual beings which inhabited them. The forest, above all, was alive with spirits—mostly hostile. The boa, and particularly the puma and the jaguar, were not merely animals capable of inflicting bodily harm, but potent spirits which could and did invade every aspect of his life. The spirits, moreover, of powerful medicine

* DE LEEUW. *Crossroads of the Caribbean Sea* (1935).

men were often transferred after death to the bodies of jaguars, and vice versa. The Djukas have evolved a similar spirit world.

The various accounts which the old Spanish writers have left us, whether they be friendly to the Indian as that of GARCILASSO DE LA VEGA,* or religiously prejudiced as that of ARRIAGA,† are identical in one respect with such modern writers as BANDELIER,‡ who has studied the native Indian in those parts where he is least touched by European influences. To all, the native mentality seems to be one in which fear, suspicion, cruelty, melancholy and resignation are the guiding forces.

It is in keeping with this psychological background that these people should exhibit to-day, as they did in the pre-Inca times, a type of sensuality whose peculiarity is its divorce from beauty.

It may be urged that against this dark spiritual background there stands in relief the highly developed legalistic attitude of the Peruvian towards justice, which reached its climax under the Incas. It is true that such a system of social law and justice did exist, but if we are to believe the Chroniclers, its execution displayed what some would regard as a high degree of sadistic cruelty, but others might more correctly attribute to the complete suppression of any sense of humour, a not unnatural result of a reign of spiritual fear.

At the risk of being considered fanciful, the writer suggests that the mentality of the native of Peru and Bolivia has been moulded by the terrors of the jungle which, like a miasma, spread over the plateau to the coast as the people migrated westward.

When the native escaping from the terror of the forest forced his way out of the Montana up the eastern slopes, he would naturally have sought out favourable spots for settlements in the more secluded valleys and the more fertile portions of the high tablelands. A typical example of the latter is the Collao, the district to the west and south of the great inland sea of Titicaca, the waters of which are some 12,500 feet, and the surrounding district between that and 15,000 feet, above sea level.

On the high plateaus there are no trees, the soil where not poisoned by borax is covered with a coarse *Stipa* grass. Here still abound the wild guanaco and vicuña. At an early date the native domesticated two varieties of the former, the common llama and the alpaca; both yielded him wool for his clothing, whilst the former acted as his beast of burden. These high plateaus, swept by driving rains, warm whilst the sun is overhead, cold and comfortless directly it goes down, enervating by reason of the altitude and shortage of oxygen, were never places for intensive settlement.

In such surroundings man had to shape his life anew. His former sources of food were no longer to hand; it was far too cold for the manioc, the staple food of the forest region, and maize would only

* GARCILASSO DE LA VEGA. "Royal Commentaries," Transl. Hakluyt series.

† ARRIAGA (1609). *Extirpacion de la Idolatria de los Indios del Peru*. Lima, 1621.

‡ BANDELIER, ADOLPH. *Islands of Titicaca and Koati* (1910).



FIG. 1. ABOVE: SPECIMENS OF ORDINARY CHUNO ON WHICH CONSIDERABLE AREAS OF SKIN BLACK STILL REMAIN. BELOW: SPECIMENS OF WHITE CHUNO OF MORAY.

The specimens are recent, but in no way differ from those recovered from ancient tombs.



FIG. 3 — AN EARLY CHIMÚ FIGURE
Natural clay colour and red. Probably represents two tubers
of Chuño

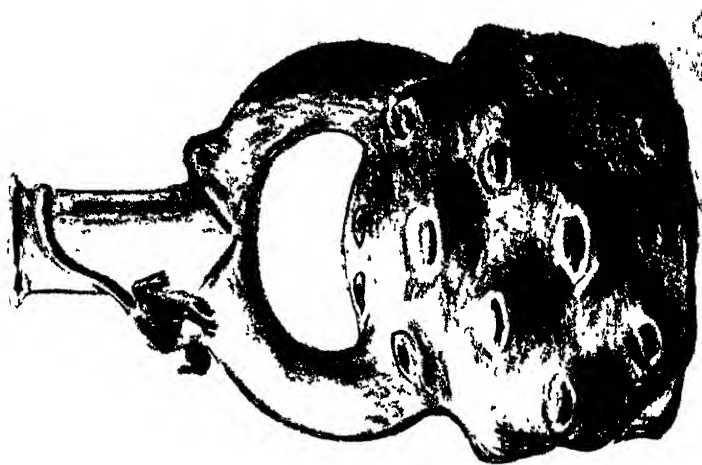


FIG. 4 — DRAWING OF A LATE CHIMÚ FIGURE
(Black)

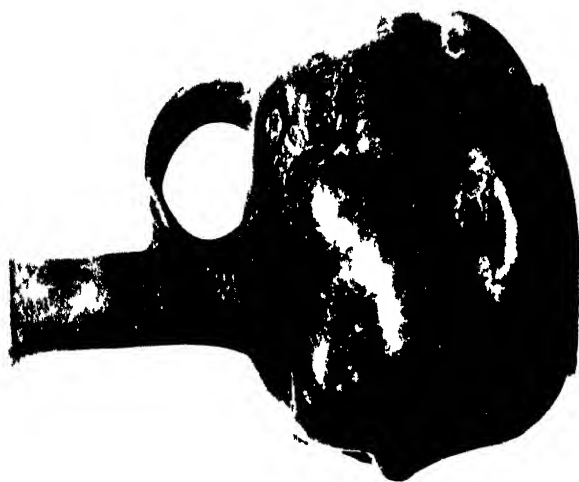


FIG. 6. POT FROM CHINCHA INCA PERIOD
Reddish brown, representing a potato tuber

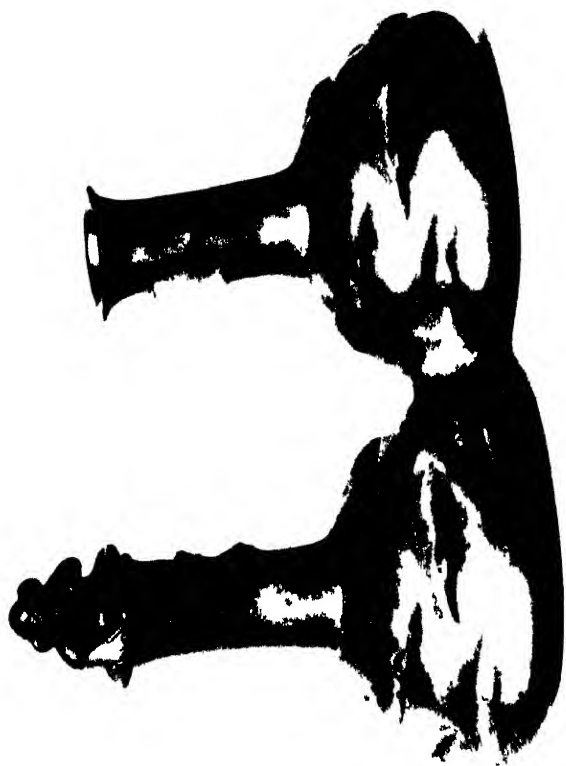


FIG. 7. BLACK CHINCA POT FROM SIN LIMPI
Black polished double pot representing two potato tubers



FIG 7 —POT OF LATE CHIMU PERIOD
Black the pottery design more conventionalized C h 5

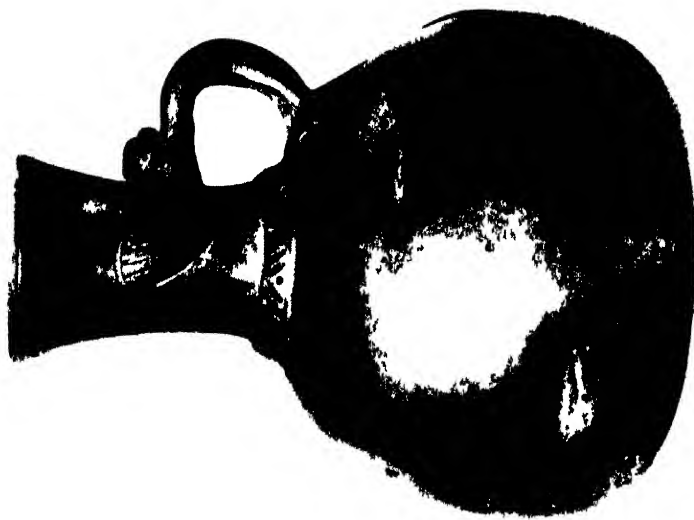


FIG 8 —POT OF
Black polished
ized pottery tul

CHIMU OR INCA PERIOD
senting a conventional-
th well developed eyes

grow in the more sheltered spots where the altitude was not above 12,000 feet, and even so the plants were stunted and yielded little. He had to look for hardier food plants.

If a settlement was to be effected the immigrant had of necessity to provide himself with foodstuffs which would grow under these unfavourable conditions of the highland plateau, and at the same time protect himself against the frequent destruction of his vegetable crops by frost. A great, perhaps one of the most remarkable of man's conquests of Nature gave him the key to success.

On the Andean highlands, from Colombia in the north to Chile in the south, there grow several species of wild tuber-bearing *Solanums*, the parent stocks of our domestic potato. Some forms are found practically on the snow-line, 15,000 to 16,000 feet high, but these are of little value as human food; others, which grow at somewhat lower levels, are considerably more resistant to frost than European varieties and yield useful crops of tubers. At some very early stage the South American native cultivated several types, amongst them a peculiar hybrid form which is relatively frost-hardy.

The next step was to elaborate a method for the preservation of the potato—a process which we know was in use nearly two thousand years ago and which is described later, was devised, and the product *chuño* is to-day used as a common food throughout South America. It was probably here also, on the altiplano, that man discovered how to preserve llama meat by sun-drying; the product was called *charqui* in the Quechua tongue, which has become "jerked" (meat) in English. Thus it was by the discovery of the potato, the cultivation of frost-hardy types, and the preservation of foodstuffs, that man solved the problem of how to live permanently at great altitudes, and thereby attained the mastery of a continent.

Besides the potato, other useful local sources of food were found: *quinoa* (*Chenopodium Quinoa*), whose seed is used in much the same way as oatmeal is in the Highlands, *oca* (*Oxalis tuberosa*), a tuber-bearing plant which is exceptionally hardy, and *ulluca* or *Papa lisa* (a species of *Basellaceae*), a tuberous plant, all of which grow on the altiplano. But none of these plays a part in the economic life of the peasant at all comparable with that of the potato.

It is curious that the native of these parts made so little use of the llama as a food, and none at all of its milk. Indeed his chief source of animal nourishment was and is the tame guinea-pig or cuy, which is allowed to run free in his dwellings.

Here on the high plateaus and in the lofty valleys the natives to-day live their lives in much the same way as they did before either Inca or Spaniard intruded upon them. On the plains, or perched on almost inaccessible heights overlooking them, are the low windowless thatched stone huts of the native and near by his small enclosed fields or his carefully built-up terraces. We shall see that the natural outcome of the agricultural requirements dictated by potato-growing in a semi-sterile and frost-ridden environment

has led to a peculiar communism which has existed for countless centuries in these distant outposts of man's dispersion and which goes far to explain the cause of his persistence.

It was in such highland spots as the Collao that man first made use of the potato. We may go further and say that it was the potato which made residence on these plateaus possible, and if it be true that man's progress to the coast was via the Andean passes and the altiplano, then we may say that the great cultural developments of the coastland were ultimately dependent on the all-important association which grew out of the presence of the wild potato and man's pressing necessities.

One is tempted to speculate as to why the immigrant from the forest did not restrict his settlement to the more temperate valleys, such as the Yungas of Bolivia, which he would have encountered before he reached the altiplano. If, as is suggested, it was terror of the forest which drove him westward, it is unlikely that he would tarry any time in his flight till he found surroundings free from the dangers of his old home. Such would be the lofty if inhospitable altiplano. Here, one imagines, it was not long before he discovered and exploited the llama and potato, finding in them permanent sources of food and clothing. It was later that he migrated to the inter-Andine valleys and thence to the coast, bringing with him his new-found allies.

Notwithstanding the brilliant use to which man put the wild plant he found in these inhospitable parts, life on the altiplano must at all times be a severe struggle, holding out little material reward either to cultivator or shepherd. Nor has the native created for himself a spiritual haven in which he might shelter, but rather has allowed his subjective life to become enmeshed in a world of phantasy peopled with innumerable malignant spirits, any of whom may be a potential enemy.

It is not, therefore, surprising that a people who entered on life's adventure with so sombre and macabre a background should readily avail themselves of such relief as might strengthen their endurance or dull their pain. Fortunately Nature had not left them without opportunity, nor their own ingenuity without the means to make use of it. In the Montana there grows a small bush—the coca—the source of the alkaloid cocaine; it is to be found at a level of 5,000 to 6,000 feet, *i.e.* about half-way down the eastern slopes of the Cordillera in those parts of the Montana which are more readily accessible from the altiplano. When and how the natives discovered the hidden magic of this plant, or how they found out that to obtain its maximum effect it was necessary to add a pinch of ash or chalk before masticating it, neither history nor legend records. The early Conquistadores observed that everyone they met, whether of high or low degree, had a wad of the leaves in their cheek, which they continually chewed, and finds in graves and representations on ceramics of the early Chinese period show that the people of the coast made free use of it. The modern traveller reports the same, and both ascribe, possibly rightly, the

remarkable endurance of the native carriers and labourers, especially in the high altitudes, to this practice. How far the habit is responsible for the early ageing and short life-span of the native peasant is a question still awaiting an answer.

If the coca plant offered the sorely tried native a certain measure of escape, a dulling of the sense of pain, the discovery of alcoholic fermentation, which may be as old or older than that of coca, afforded him an opportunity for enjoyment, artificial and temporary perhaps, but nevertheless affording some escape from the sordid reality of life. From the earliest times he brewed a drink, generally from maize, but when that failed from quinoa and even from the potato: this beer, or *chicha* as it was called in the Quechua tongue, was no temperance beverage; it was and still is consumed on every public occasion in great quantities, and with the desired effect.

The logical and systematized government of the Inca prescribed numerous festivals throughout the year, in which all participated, and which invariably developed into prolonged orgies of drunkenness. Similar feasts with dancing and unlimited drink are still observed to-day in the Collao of Bolivia and in every Andine town and village where the Church can stage a Festa. It is difficult to believe that without the numbing of the senses by cocaine, and the periodical release from reality by drunkenness, the Peruvian could have endured either the horrors of the spiritual or the hardships of the material world in which he lived.

Whether man's migration was, as we have supposed, from the east westward to the coast, or whether the coast was reached by sea from the north, the fact remains that at a very early date settlements were established at various points along the coast. As the conditions of the coastal plane and western slopes of the Andes differ so radically from those of the Montana and altiplano, we must consider them and their relation to our problem in some detail.

South of the Equator the coast of Peru is one broad belt of arid desert intersected at a number of spots by rivers disgorging from the steep western mountain valleys, a few of which bring down sufficient water to create oases, the fertility of which is enhanced by the use of guano and fish manure. In pre-Columbian days the Incas and their predecessors constructed elaborate aqueducts and channels so that, it is said, a larger area of the coast was cultivated then than now. Here the main crop was maize; the sugar-cane was introduced by the Spaniards and now monopolizes these coastal oases. It is doubtful whether the potato was ever grown on the coast, the climate of which would be too hot. CIEZA alone of the early writers makes a reference to the potatoes growing near the coast, in the rainless irrigated valleys of the foothills. The brothers ULLOA,* writing in the middle of the eighteenth century, have given us a survey of the local products, imports and exports, of every part of the west coast of South America

* ULLOA, GEORGE and ANTONIO, "Voyage to South America," 2nd edition, London, 1760.

from Panama to Chiloe, with the exception of what is to-day Colombia. Nowhere do they record the production of the potato outside the higher mountain districts. Amongst modern authors I have found but one mention of the potato in these regions, and that probably refers to a garden crop. Indeed the potato is not found, either wild or domesticated, till the higher valleys are reached, about 6,000 feet above the sea, where it was and still is grown on the terraced hills, some of which were irrigated.

The coastal dwellers before the Spanish conquest had no domestic animals of their own, barring a dog and the guinea-pig. Nevertheless they sacrificed innumerable llamas, they wove with amazing skill the wool of llamas, alpacas, and vicuña into superb textiles, and they consumed the dry potato, chuño, as a staple in most of their foods, and probably the fresh potato too. Chuño has been found in the early pre-Columbian graves on the coast. All this implies the existence of a constant and close inter-communication between the coastal settlements and the highlands, a state of affairs which did, in fact, exist at the time of the conquest, and which was based on an interchange of commodities in which the upland-grown potato and llama wool were the chief products on the one side and maize, fruit and probably textiles on the other. A dominating factor in this barter was the llama itself, which, driven in great flocks, conveyed the goods from altiplano to coast and back, each beast bearing a load of 100 lb. on its back.

The small coastal states were dependent on an adequate control of the Sierra hinterland, if for no other reason than for the command of the water supplies. Indeed it is clear that communication in pre-Inca times tended to be vertical rather than horizontal, *i.e.* west to east, rather than north to south. These contacts were equally valuable to the upland peasant, whose vital needs became a matter of economic interest to the man of the coast, a fact which would explain how the potato had an importance on the coast quite apart from its value as an article of diet.

North of the Equator conditions were quite different: from the Gulf of Guayaquil to the Isthmus the mountains descend almost to the sea and, instead of a rainless desert which dominates the coast south of the Equator, impenetrable rain forests extend upwards to the Isthmus. In the hinterland lie the northern part of Ecuador and the republic of Colombia, where the deep valleys of the Atrato, the Cauca and the Magdalena lie hidden in the folds of the Cordillera.

It was these valleys which witnessed the most amazing, if less acclaimed, of all the Spanish discoveries and conquests. For us they have a special appeal, for it was in their struggle through the well-nigh impenetrable forest of the Magdalena valley that one of the scouting parties of GONZALO JIMENEZ DE QUESADA's expedition* penetrated

* The expedition left St. Marta in April 1536, and the raid took place about ten months later, *i.e.* early in 1537. The commission authorizing QUESADA's expedition was, however, dated 1537, and this has given rise to some confusion. though CUNNINGHAME GRAHAM was confident that 1536 is the actual date of their departure. See *Conquest of New Granada* (1922).



FIG. 1. FACE FROM CHIMPHOON SIDE VIEW
Grey and red. A conventionalized animal or human form built up of potato tubers with numerous
chem in the eyes



FIG. 10. SAME FOR FRONT VIEW



FIG. 11. LAILY CHIVU POT. FRONT AND BACK VIEWS.
Anthropoid pot built up of tubers. note the very large sharply outlined mouth.

eastward to the high plateau, and in the native village of Sorocota, about latitude 7° N., not far from the Spanish town of Velez, recorded the first encounter by a European with the potato.

I am indebted to Mr. F. A. FITZPATRICK for pointing out that CASTELLANOS, who was a member of the party, tells how in 1537 the natives fled on their approach, and that the Spaniards entered the houses and found in them maize, beans and truffles. These truffles he describes in detail: they were, in fact, potatoes. "Floury roots," he says, "of good flavour, a gift very acceptable to Indians and a dainty dish even for Spaniards." A few months later, this same expedition of QUESADA captured Bogotá,* the capital of the Chibcha kingdom, which occupied the lofty and salubrious plateau overlooking the endless llanos which lay deep below to the east of the Cordillera. Here the Spaniards found that potato and maize were the staple foods of the people.

It was but a little later, viz. in 1538, that CIEZA DE LEON, a private soldier on an expedition in the district of Popayan, about latitude 2° N., observed the potato and described it. CIEZA's account,† published in 1550, has always been held to be the earliest record of the potato, but there seems no reason to doubt that CASTELLANOS‡ has the right of priority, though his manuscripts remained unpublished till 1886.

In Colombia, however, the potato, which was the staple food of the upland plateau, was unknown on the adjacent coast, a fact which may be correlated with the absence of the llama in these regions. This lack of inter-communication between coast and sierra probably accounts for the less developed civilization of Colombia as compared with that of Peru.

I have described the two extreme types of environment, the tropical luxuriant coastal oasis, and the cold, bare upland in which man established himself in the Peru-Bolivian areas. There are, however, temperate zones which intervene and within which, separated by relatively short distances, a great variety of climate, soil and culture may be found. The district known as the Yungas, a belt of land extending on the eastern side of the Peruvian-Bolivian Cordillera, is a good example of the grading of one type into the other.

JONES § describes this region as follows: "A narrow strip of deep valleys and high mountain spurs, the Yungas stretches from the arid monte of northern Argentina to the major break in the eastern Cordillera just south of the Marañon. Bordered on the east by arid chaco, broad savannas, and dense tropical forests, it extends from true tropical climes at about 2,000 feet, to cold areas near 10,000 feet in

* Strictly, the city of Bogotá was the creation of QUESADA, who founded it not far from the town in which Bogotá, the chief of the Chibchas, lived.

† CIEZA, PEDRO DE LEON. *The Chronicle of Peru* (1550), Transl. Markham, Hakluyt Soc. 1864.

‡ CASTELLANOS, JUAN DE. *Historia del Nuevo Reino de Granada* (1536), Publ. Madrid, 1886.

§ JONES, CLARENCE. "Agricultural Regions of South Africa." *Economic Geography*, 5, 277.

the Cordillera." In a few hours, he tells us, one may descend some steep winding treacherous trail, leaving behind the llama flock, the potato patch and thick-walled hut of the half-starved Indian on his cold and wind-swept plateau, to find oneself in a sweltering heat, tormented by insects, exposed to fevers in the forest home of the nomadic Indian, on whom in return Nature has bestowed unlimited food.

In the temperate valleys are found not only extensive terraces reaching 1,000 feet up the mountain-side, but also large levelled fields made up of alluvial soil which has been conveyed thither from the river beds and retained by stone dykes. These were probably constructed in Inca times and were used for growing crops, including the potato. In these regions the potato is grown extensively but only assumes a position of commanding importance in the higher and colder valleys. The relation of the potato to the social economy of the various regions we have been considering, may be briefly stated.

In the coastal area the potato was in no way essential as a food, but acquired a secondary importance due to the politico-economic relation which existed between coast and sierra.

In the temperate areas the potato held no preponderant place in a dietary which included both a large number of nutritious roots and the cereal maize.

In the bleak highland plateaus the potato formed the daily and chief food of the people ; its importance was further enhanced by the fact that, by a method of conservation, it became the safeguard against famine, which the destruction of the crops by severe frosts so often threatened.

It was in these same highland districts that VAVILOV and his collaborators have shown that the potato developed in late geological times the numerous sub-species and varieties which are found wild there to-day, and which formed the raw material from which the early immigrant selected the plant he subsequently learned to cultivate.

In districts such as these, life is a more or less continuous struggle in a field in which man's action is directly restricted by limiting factors over which he may have no control. Such a factor is the temperature of the air and soil.

In the direct sunlight the temperature of the air may be hotter than is comfortable, whilst in the shade it may be not far off freezing. The nights are always cool, light frosts are common and severe ones not rare ; hence the temperature of the soil is always low. There is very little seasonal variation in the climate : from October to April, which is regarded as winter, there is more rain, but actually the temperature is higher than in the summer months. It is said that if one harvest of potatoes or ocas in five is secured, it is regarded as satisfactory. To meet this emergency, the natives cultivate certain varieties of potato which withstand several degrees Fahrenheit more of frost than do our own. The Russian investigators have identified and named these, of which the chief are *S. Ajanhuiri* and *S. Juzepczukii*.

Both of these, though very similar to our own potato in external characters, differ by reason of their chromosome formulæ; that of the first is $2n = 24$, that of the second $2n = 36$, instead of $2n = 48$, the formula of the potato of Europe and of most of those in cultivation in South America. Both these forms are sexually sterile, though *S. Ajanhuiri* may occasionally function as a female. This latter species occurs as two cultivated varieties, one with white, the other with purple tubers. An important point about these frost-resistant potatoes is that they are strictly adapted to the short-day environment of these latitudes.

There is good reason to believe that *S. Juzepczukii* is a hybrid derived from a cross of two distinct species, one of which was *S. acaule*, a rosette type bearing few and small tubers but capable of withstanding 10 degrees (Fahrenheit) of frost. It is probable that this cross took place in Nature, but the fact that the hybrid offspring should have been selected and cultivated implies not only a high degree of intelligence on the part of the native cultivator, but a sustained agricultural experience. Were we to assume, as indeed we scarcely dare to do, that the original hybridization was made by man, and the offspring selected, then we must picture a stage of agricultural development comparable with that of the nineteenth century in Europe. The bare facts are enough, construe them how we will: the native Indian cultivator did select certain weeds—for that is all the wild potatoes are in these lands—recognized their individual habits, and found that one might suit the conditions of a temperate valley, another that of the snow-line in the bleakest Puna. Whatever our conclusions may be as to his general state of culture, mental and economic, we are at least justified in assuming that pre-Columbian agriculture of Peru attained a level sufficiently high to justify the assumption that very many generations must have elapsed before such was acquired.

The frost-resistant varieties which we have described and which are those mainly grown at the highest levels are insipid and tasteless and are to-day reserved for the manufacture of "chuño," of which I shall have something more to say directly.

In order to enjoy palatable potatoes, the peasant to-day, and probably his forefathers for many centuries before him, cultivated other varieties, some closely akin to our own, and these were naturally given the more favoured location. This may be regarded as the second stage in the evolution of the domestic potato.

One variety still grown, and which is a great favourite, is the *Papa amarilla*, a yellow-fleshed sort, of excellent flavour, with the chromosome formula $2n = 24$. We have evidence from the pottery found in the early tombs that this variety, or one very like it, was in use as early as A.D. 800, if not earlier. This, again, must be regarded as a case of conscious selection, for the common potato of the Andes has the chromosome formula $2n = 48$. Of this type, the common *S. andigenum* potato, there are some ninety or more varieties, cultivated by native agriculturists to-day, differing one from another, like our own, in colour, shape, season and taste. Mrs. CLARENCE WOODS,

in her entertaining book, "High Spots on the Andes," tells how recently, at La Paz, at the Potato Fair, 89 named varieties were exhibited, which illustrates the horticultural skill of the native cultivators no less than the great importance of the potato in this country. Because dependence on the potato led to outstanding improvements in its cultivation, we must not shut our eyes to the danger which such dependence on an easily raised staple crop may bring in its train. Just as in Ireland, when the peasantry built up their whole economy on the potato, the blight of 1846 brought about its collapse, with untold misery, so on the altiplano, failure of the crop threatened the native with starvation or emigration.

CIEZA tells us that the natives of the Collao on the uplands south of Cuzco, where in his day no maize was grown, were happy and contented when the potato harvest was good, but when bad their distress was great. The Indian solved the dilemma by making use of his worst enemy, the frost, and saved himself from either fate. This discovery, which he made many centuries before the establishment of the Inca Empire, circa A.D. 1100, was the manufacture of chuño, a product which neither frost nor damp could injure. Chuño is made from potatoes, but the oca is occasionally treated in the same manner. The method as described by an eye-witness is precisely the same to-day as that given by the early chroniclers. Actually the method varies according to the kind of chuño required. The potatoes are spread out on the ground and left there during the night to freeze. If they are making "tunta," or white chuño, also called "moray," for which *S. Ajanhuiri* is especially grown, then, before the sun rises, the potatoes are covered with a layer of straw; but if it is the common sort which is desired, they are left uncovered; in either case men, women and children all turn out and "tread" the tubers with their bare feet in order to squeeze the water out of them. The potatoes destined for tunta will again be covered during the day, the others left exposed to the sun. The whole process is repeated on four or five consecutive days. At the end of the period the ordinary chuño is dried off and stored; the tunta stock, however, is next put into a shallow pool of water and left for two months, after which it is dried off in the sun. Moray, like the ordinary chuño, still retains the shape of the tuber, but it is snow-white and, in comparison with the common chuño, very light in weight (fig. 2). From it a flour is made which has been regarded from an early date by the Spanish housewife with great favour.

Throughout the ages, chuño has meant more to the native than bread has to us. No chupa, or stew, was or is to-day thinkable without it, not a journey undertaken without carrying a supply of it.

But chuño, though essentially a product of the cold regions, became an article of general domestic use in Peru; manufactured in the heights, it was carried down on the backs of the llamas to the lower valleys and to the coast towns. The convoy which brought the chuño from the altiplano took also the long-stapled wool of the alpaca and the precious silky fleece of the wild vicuña, all of which were

bartered—and are so still—for maize and manioc, pots and beautifully woven cloth, in the markets of town and village all through the land.

Like many another of the gifts of Nature or of man's own making, chuño has an anti-social side to its history. The great silver mines of Potosi, discovered in 1545, were, of course, manned by native workmen, of whom, in the colonial period, untold thousands are said to have perished by reason of ill-treatment in their deep galleries. These slave-workers were maintained almost exclusively on chuño, and bitter is the complaint raised by CIEZA DE LEON against the middlemen who swarmed out of Spain, bought chuño cheaply from the producer and, after selling it at a high price to the native workers, returned home with their ill-gotten fortunes. But we must leave for some other occasion the consideration of the influence on man's social economic problems which the potato may have had. Suffice it to say that, as with every article of food on which human groups rely more or less exclusively, the potato has exerted a very definite influence on social development.

(To be continued.)

THE CLASSIFICATION OF GARDEN TULIPS: A SUGGESTION.

By Sir DANIEL HALL, F.R.S., V.M.H.

THE classification of any group of garden plants generally proceeds upon some basis of origin, depending upon the wild species and the particular hybridization that gives the dominating character in each group. For example, we find roses divided into hybrid perpetuals, teas, hybrid teas, Pernettyanas, polyanthas, etc., each class being founded upon some distinctive feature of breeding. With Narcissi this genetic principle has been abandoned; the number of originating species is small, and the intercrossing has been so thorough and long continued that a completely graded series of flowers exists between the extremes of the trumpet daffodil at one end of the scale and the flat-cupped poeticus at the other. But some scheme of classification is needed as a guide to the buyer and for the convenience of the makers of catalogues and schedules, and consequently one has been drawn up based upon the foot rule, with colour distinctions to mark sub-sections.

Among the garden tulips a genetic classification is impossible because all the varieties belong to a single complex, possibly a single species, which came to Western Europe from the East in the sixteenth century and already possessed the whole range of variety we know to-day. The early florists simply divided tulips into singles and doubles, early and late flowering. By degrees other classes were differentiated. The Van Thols were distinguished by their special earliness and their small size. In the eighteenth century and early nineteenth century the Dutch and the English florists followed slightly different lines and formed two groups with only minor points of difference. When tulip-growing for general garden purposes began to be revived about the 'seventies of the last century a new class, the Cottage tulips, was formed, an *omnium gatherum* group to include a lot of attractive flowers that had been cast out as not meeting the requirements of the fanciers but got preserved because of the pleasure they gave to the non-specialist eye. "Breaking" always complicated the task of classification, because the breeder tulip took on such a very different aspect when it became variegated with stripes and fringes of colour on a white or yellow ground. The few Parrot tulips also found a class of their own. Then in 1886 Krelage introduced a new class, labelled 'Darwin' tulips, the outcome of long selection by certain florists in Lille, who had very definite ideas of the kind of flowers they wanted. They had hit upon a strain of immense vigour and substance, with tall, stout stems and broad petals which give to the opened flower a distinctive square profile at the base. They had also eliminated all yellow grounds. But even on their introduction not all the 'Darwins'

conformed to this specification. 'Clara Butt,' for example, has the rounded outline of the English and Dutch breeders, 'Millet' and others have relatively thin stems. Again, the Dutch breeder 'Velvet King' could as well be placed among the Darwins. However, the introduction of the Darwins with their instant popularity did not add much to the difficulties of classification.

As long as the new varieties being brought forward were the products of chance fertilization, such classes as had been made were reasonably maintained. Tulips were grown in blocks of the same class, earlies got fertilized by their neighbouring earlies, Darwins by Darwins, and so on, but early in the present century deliberate cross-fertilization began. Belonging as they do to one common genetic stock, all the garden tulips are interfertile, and it only needed a little management to cross early with late or make any other mixture the breeder desired.

Of recent years we have seen the introduction of 'Mendel' tulips, products of crossing between Darwins and Van Thols. As might be expected, they are mainly intermediates, neither as tall as the Darwins nor as early as the Van Thols or even as the old 'earlies.' There are many fine flowers among them which extend the range of the garden tulips, and they possess some of the vigour which generally attends an out-cross. But it is impossible to draw up a specification which will define a Mendel tulip and mark it off from the existing varieties among the Cottage tulips or English or Dutch breeders. Later still we have the 'Triumph' tulips, the history of which is not generally known, but which seem to be the offspring of crosses between the older earlies and late Cottage or Darwins. As a class the Triumphs are still more indeterminate than the Mendels: examples could be put into pretty well every existing class. But where is this multiplication of classes only definable by a label to end? Breeders are at work crossing Darwins with Cottage, English with earlies; even the species are being introduced, *vide* 'Advance' and 'Mayflower,' and many other such hybrids exist, in small lots as yet. For example, I have a most varied collection of seedlings from all sorts of crosses: shall I put them out as 'Bateson' tulips or 'Merton' tulips? The introducers naturally want to keep their distinctive labels, as long as they can secure thereby the attraction of novelty. Again, an introducer wants to get his stuff into a popular class, hence the demand to introduce pure yellow varieties into the Darwins, in direct contradiction of the original definition. Confusion will be added to confusion; already I find in current catalogues thirteen to sixteen classes of tulips, irrespective of species.

The time has come to make a fresh start, recognizing the essential unity of the group, one that will throw overboard all the imperfect suggestions of origin and base its classification upon convenience and the requirements of the buyer.

What does the ordinary buyer of tulips for the garden want to know when he or she opens the catalogue? First and foremost she

knows what colour she wants, after that she needs to be told how tall they will grow and when they will bloom. Shape is also a consideration, for though the majority of tulips are cup-shaped, the 'lily-flowered' with pointed reflexing petals are distinct and have their admirers. It is thus impossible to make a single-line classification, and a logical one based on the three or four characteristics enumerated would be needlessly cumbrous. We are driven to compromise based upon practical convenience, and thus we can take numbers as a guide whether a class is needed or not. If then we can get the big class—the late tulips—into order, as we can by making the colour the criterion, we can put up with some lack of logical completeness in the rest.

So I arrive at the following scheme :—

Single Earlies.—Van Thols, Dwarf, Tall.

Single Mid-Season.—Dwarf, Tall.

Single Late.—White Selfs, Yellow Selfs, Pink and Rose, Crimson, Mauve and Heliotrope, Full Purple, Orange and Bronze, Scarlet, Picotee, Broken or Variegated.

Doubles.—Early, Mid-Season, Late.

Lily-flowered.

Parrots.

Of course all the classes like dwarf earlies, tall mid-season, or lily-flowered, could be subdivided by colour, but their numbers are not so great as to make this necessary. It will always be open to the catalogue maker who wants to call attention to the origin to specify it within brackets after the variety name, *e.g.* 'City of Haarlem' (Darwin), 'Mozart' (Mendel).

What can be claimed for this classification is that it is simple enough to enable buyers easily to find what they want, and that every known variety can be placed. Of course there must remain intermediates : 'Couleur Cardinal' and 'Keiserskroon' may be regarded either as early or mid-season, roses shade into crimson and so forth, but as a practical measure it will put an end to the increasing confusion of the catalogues. Another advantage is that by getting all the varieties that serve the same purpose in the garden into the same class it will help towards the elimination of redundant and inferior varieties. The commercial bulb-growers have their ground cluttered up with all too many varieties already, and the maintenance of so many different kinds only adds to the general cost of tulips.

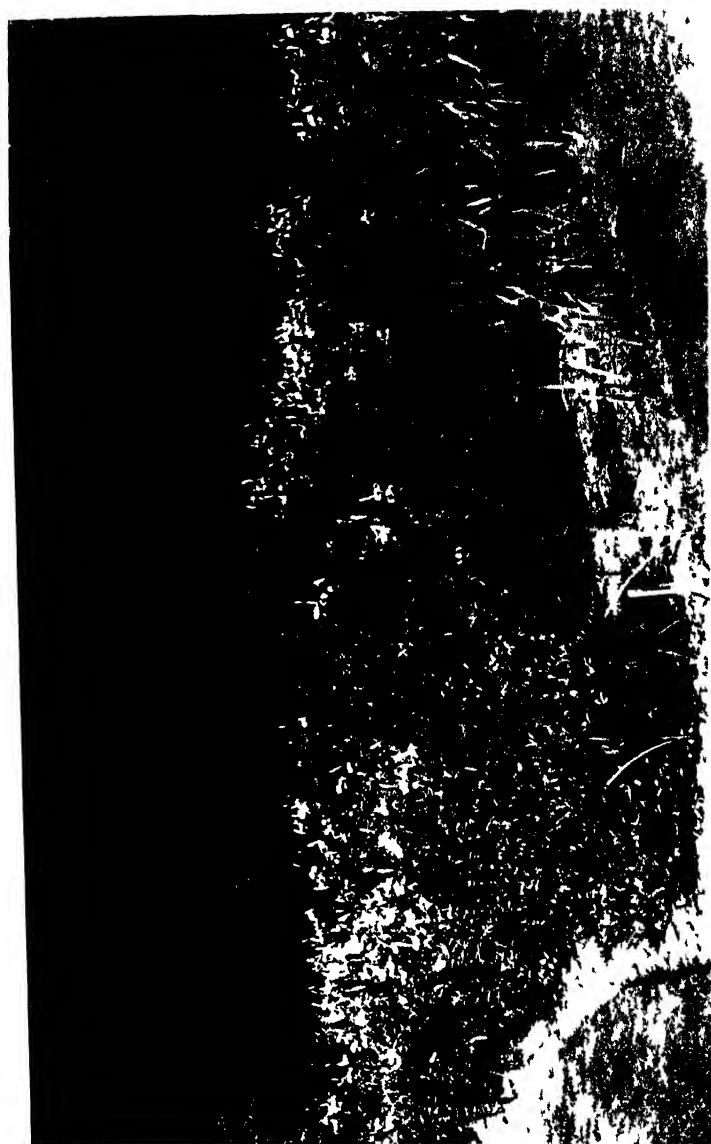


FIG. 1. *PHILUM TIGRINUM* SILLBOM AT WISLA



143 THE LILIES IN DR. STOKER'S GARDEN

LILIUM BROWNII VAR. COLCHESTERI WILSON.

By JAMES COMBER, V.M.H.

" THIS is the common trumpet-flowered ' Lily of China,' and probably grows wild in every one of the eighteen provinces of the Empire from sea-level to 5,000 feet altitude according to climate. It is the ' Peh-ho ' of the Chinese and is also cultivated for its bulb, which is esteemed a table delicacy " (Lilies of Eastern Asia, WILSON).

It might have been thought that a Lily so common and well distributed in its native country would have become equally so in this country. According to the same author " it was one of the earliest of Chinese Lilies to reach English gardens," at a time, too, when many new plants were being successfully grown under glass, so the question of hardiness scarcely arises. It would seem that, having secured *L. Brownii* F. E. Brown, nurserymen and others were content, indeed anxious, to keep to this only, to the exclusion of the many other forms or varieties which occur from collected seed of *L. Brownii* var. *colchesteri*. To select the best, or what they considered likely to be the most popular, form and to propagate it vegetatively was in keeping with the regular practice of nurseries of that time. The fastigiata form of *Libocedrus decurrens* common in this country is a case in point, and coming to more recent years, the selection of *Clematis montana rubens* by VEITCH from among the many coloured forms arising from WILSON's seed.

L. Brownii var. *colchesteri* is known to me from numerous seedlings raised from cultivated seed, now planted and flowering in the open ground in this garden, from seeing it exhibited at various shows, and growing under nursery conditions and in one or two private collections. Specimens which I have noted during several years vary considerably. In most cases the stems are from 2 to 5 feet high, leaves variable, from 3 to 7 inches long and three-quarters of an inch wide, gradually, though not always, diminishing in size towards the upper part of the stem, with a bare portion just before the flowers are reached ; a few bracts are interspersed among the flower-stalks. The shape of the flowers also varies, being generally broader and more openly funnel-shaped than in *L. Brownii* F. E. Brown ; the exterior is brownish-purple or greenish-white ; the interior is yellow, green or white with a strong tinge of green, while the more open part, though cream at first, becomes a very pure white. The style is the same length as the flower, the stamens are an inch shorter, anthers a rich brown, pollen orange-brown, sometimes almost yellow. Its fragrance is easily detected at some distance and is no less pleasing at close quarters. This variety gained a well-deserved F.C.C. when shown by Messrs. WALLACE, then of Colchester.

It grows freely in the open (fig. 13), but I am inclined to think that a warm, dry position is best suited to it, a situation where the bulbs are not subject to a stagnant, wet condition of the soil. Perhaps some artificial covering, even a conical heap of ashes, over the clump would be beneficial in shielding the bulbs beneath from continuous rains in winter.

Seedlings planted here in the open ground have passed through two winters successfully, but have suffered in 1936 from the wet weather and dull days which we have experienced in Sussex. Botrytis has claimed some of the foliage and several of the blooms. The finest variety, and one which I marked down last season, has fortunately escaped damage. This plant measures 5 feet 6 inches in height, the largest leaves are 7 inches long and three-quarters of an inch wide. Its three flowers each measure, from the base to the opening of the funnel, $7\frac{1}{2}$ inches long, with a width of 6 inches; they are greenish-white outside prominently veined with green; inside, green, deep in the centre, the rest very pure white. This particular variety of *L. Brownii* var. *colchesteri* has particularly fine lines as well as very pure colouring, and I am hoping to propagate it from scales. Its late-flowering character will probably prevent the production of seed except under glass.

APPLES.

AN AMATEUR'S NOTES AND AN EXPERIMENT.

By Lt.-Col. G. SPEIR.

THERE is no claim in these notes either to deep scientific knowledge or wide experience. The practical work on which they are based is almost entirely concerned with fruit growing North of the Tweed and therefore may possibly be of little interest or value to those who have either the misfortune or the good luck to reside South of that river. It concerns apple trees grown in various forms—grass orchard, espalier and cordons—and applies commercially only to sales surplus to household requirements.

The cultivation of apples in private gardens for use in the grower's home has increased rapidly in recent years, and the number of enthusiastic amateurs who work their own trees has also largely increased, and a far wider knowledge of the difficulties and possibilities of fruit cultivation has become easily available to anyone who is interested. Of the many sources of information which are available, probably the best for the average amateur gardener are contained in the series published by the Ministry of Agriculture and Fisheries.

The varieties of apple listed in most nursery growers' catalogues, and on sale in fruiterers' shops or market stalls, are perplexingly numerous, and many of these varieties are neither worth the cultivation nor the purchase as dessert fruit. "Appearances," we are told, "are deceptive," and yet the majority of apples sold are sold on "appearances" and the prizes at most horticultural shows go, again, largely on "appearances"—the colour, the size, the shape—and above all the colour is what attracts the eye and also the purchaser.

Have you ever noticed, in wrath perhaps, what amazingly good judges of really good fruit blackbirds are—they always seem to attack the ripest and the best-flavoured varieties of apple, and equally scorn the gaudy 'Worcester Pearmain' and the flaming 'Charles Ross'—varieties which are beloved of gardeners, salesmen and show judges; and if you study the devouring habits of the disgusting slug, you will find fallen 'Worcesters' and 'Charles Ross' are comparatively immune from their attentions. Presumably the blackbirds get tired of denting their beaks and the slugs get tired of blunting their teeth—if they have any—on such poor quality fruit and have learnt that "appearances are deceptive"—for both varieties are among the most attractive looking of apples and yet are at the same time of poor quality both as regards texture and flavour if used as dessert.

Any method or process by which the appearance of good varieties of apple might be improved, especially in colour, would therefore be

worth trying, provided, of course, that the cost of the process were small and the labour involved not too great. Special chemical feeding is, of course, known to help, and there may be other ways, such as special stocks, not so well known, but the process here described seems to meet most of the requirements and to produce the results aimed at, at a cost which is practically negligible and adds little or nothing to the usual labour and time required in the ordinary course of picking and storing apples.

Having frequently observed that apples which had fallen in a grass orchard, if they were not much damaged by the fall and escaped the destructive attentions of birds and slugs, ripened well and coloured far more vividly than fruit picked off the same tree, it was decided to make an experiment. Some apples (of different varieties) were picked off the same trees and spread over a square of old paving stones and in a position fully exposed to wind, sun, or rain, but the results of this first attempt were not satisfactory—apparently the paving stones formed a too hot and dry place. A further experiment was then made with a similar collection of apples, but in this experiment the apples, instead of being spread on the paving stones, were spread on a closely mown lawn, again in full exposure to whatever the weather might be. This experiment proved an almost unexpected success.

In this second experiment, and very quickly, the apples took on a very definite and attractive crimson flush which gradually deepened and spread almost all over the fruit.

The varieties of apple which were tried with this process took on colour in periods varying from 3 or 4 days to 10 or 12 days, according to the variety of apple, the weather and the date. The following year (1936) the experiment was repeated and the results varied very little from those obtained in 1935. The period of treatment by this process was approximately from August 20 to the end of October. The apples took the flush rapidly at the beginning and more slowly at the end of the period. Very early apples such as 'Irish Peach' responded quickly, but as these and similar early varieties ought to be eaten as soon as they are picked, they are hardly worth treating. Varieties such as 'James Grieve,' 'Cutler Grieve,' 'Epicure,' 'Lady Sudeley,' 'Rival,' and 'Cox's Orange Pippin' all responded amazingly well to this process.

Other varieties such as 'Golden Spire,' 'Lane's Prince Albert' and 'Ecklinville' did not respond, or very slightly, but it was noticed that if the fruits of these varieties had a cut or similar blemish, distinct, very distinct, scarlet lips appeared round the cut and a sort of scarlet rash round any small damage such as tiny holes or pricks. The apples appeared to take colour according to their exposure to the air, and if placed upside down to acquire colour at the base. It is, of course, possible that some part may be played by chemical action from the grass and soil, but the main effective element is apparently the sun.

All the paraphernalia required are nets and stakes to keep the birds



FIG 14.—THE HLAH GARDEN, WISLX, IN SEPTEMBER

To face p 84

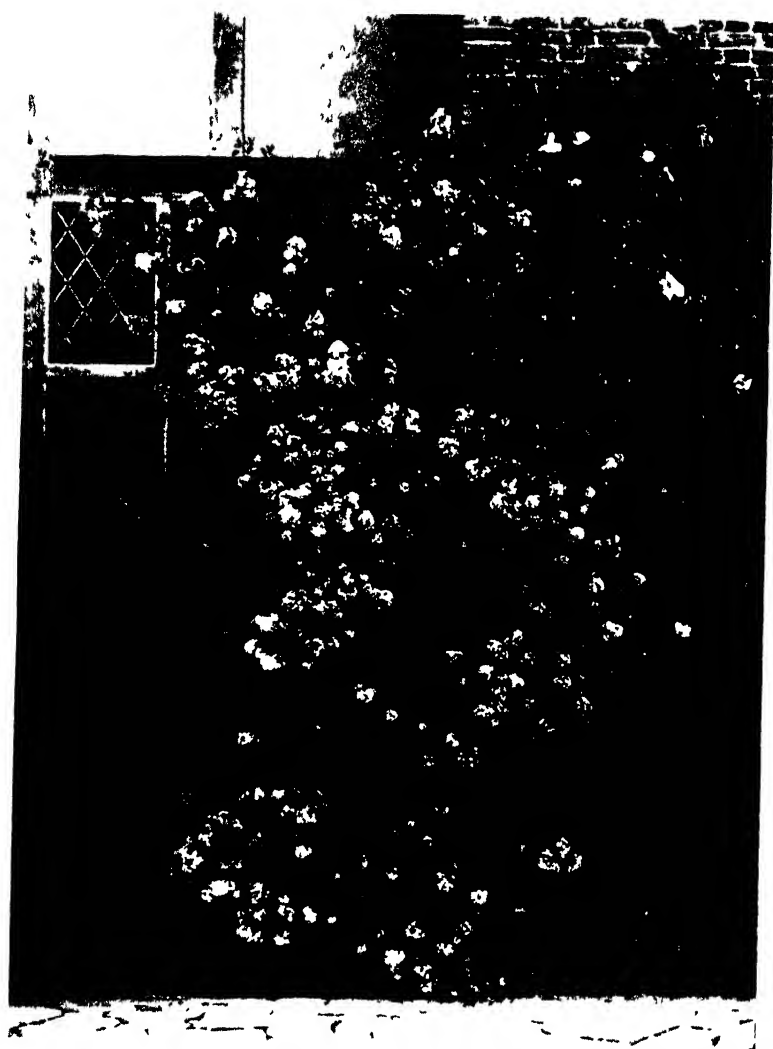


FIG. 15—*ESCALLONIA MONTIVIDENSIS* AT WISLEY WITH ROSE 'MERMAID'

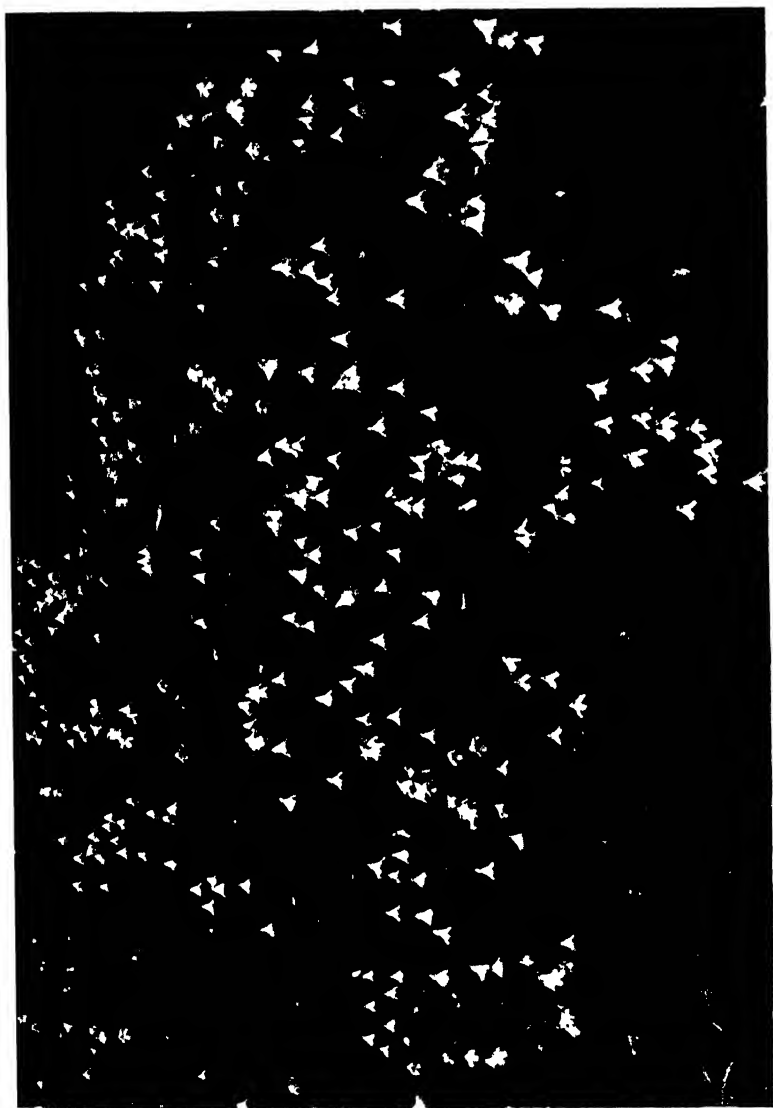


FIG. 16. SHORTIA GALACHOLIA VI WISJUY IN APRIL



FIG. 17 LOOKING FROM THE WILD GARDEN TO THE ROCK GARDEN
WISLEY

[To face p. 85]

off. The grass, of course, must be closely mown, then there will be practically no damage done by slugs. Apples should be placed on the grass in the usual way—stems down—in fairly close rows. Inquisitive worms tend sometimes to throw up little mounds of earth which soil the apple bases, but that can easily be dealt with.

There is one great advantage in this process, so far as colour and ripening are concerned. Apples can be picked in any weather, for the fruit has to put up with rain, sun, or any weather, on the grass, and all that is necessary before removing the fruit to the permanent store is to sort and move it on a dry day. So far as these experiments have gone there does not appear to be any change in the "keeping" qualities of the varieties so treated, and certainly as regards those of the late varieties of apple there is no difference, but it might affect, if the period of exposure was too lengthy, some of the mid-season varieties; a too long exposure on the grass might possibly, so to speak, overripen them.

A few varieties of Pear have also been tried, but they have not so far responded to the lip-stick and rouge treatment—not sufficiently modern, perhaps—anyhow a crimson 'Doyenné du Comice' might be a shock.

To sum up: It is a process which costs little or nothing, is very little trouble to try, and the humble amateur can get some fun out of it cheaply and astonish his friends; and if any commercial grower likes to experiment on these lines he may find he can, until the process is widely practised and improved on or some better method is devised, add appreciably to the price he may get for his fruit. A difficulty may arise; it has already been experienced, because customers will not believe the brilliant fruits are correctly named, but from a commercial aspect the ready sale is an effective answer.

In conclusion may the writer, after many seasons of personal handling of all work in apple-growing with many failures, add a few notes for amateurs. Thin your apples remorselessly; almost every amateur leaves too many fruits on his trees or cordons—"Get your worst enemy to thin your trees," was the best advice given by an old and wise gardener. This thinning enables the grower to get the maximum weight of standard-sized apples off a tree without overcropping (and the subsequent result of a large number of small apples which exhausts the tree and may lead to bi-annual fruiting) and, of course, has no reference to, or sympathy with, the rather childish effort to produce a small number of gigantic apples far in excess of a useful or standard size. These monstrous apples appear far too frequently in horticultural shows, and their absurd size far too frequently appears to hypnotize judges by their huge proportions into giving them the prizes instead of to well-grown apples of the standard size, which should have been preferred as showing good cultivation, good commercial value, and attractive fruit for your own use. Pick your apples: don't pull them off. In some localities the procedure is called "pulling" apples—and quite true and faithful is the description. Many gardeners say "That tree is ripe" (because a few apples on it are ripe), so they jolly

well "pull" the lot in one go—a fatal procedure. Picking a tree may, and very often should, continue over a period of three weeks or more.

Go over your orchard and cordons and mark all those varieties which are of little value. You will find probably a goodly percentage come under this head ; cut them over and graft them with better, and in some cases, perhaps, new experimental varieties. Provided they are healthy, you will get far cheaper and far quicker results by this than by digging out the old trees or cordons and replacing them at considerable cost by young plants. Most forms of grafting are easily learnt, and with a little experience failures are few.

The public are becoming more discriminating, and soon poor varieties of apple will be unsaleable ; so why grow them ? The cold store and other scientific methods bring extraordinarily good apples at all seasons of the year from all parts of the world to our markets, and the time may come when no one will buy or eat as dessert fruit anything but a 'Cox's Orange Pippin' or a 'Doyenné du Comice' pear. Some excellent new varieties are being produced and there may be better to follow, but that is looking some time ahead. Meantime no apple can beat for flavour an apple that is grown and ripened North or South of the Tweed.

PLANTS TO WHICH AWARDS HAVE BEEN MADE IN 1936.

Cattleya × '**Porcea.**' A.M. November 10, 1936. This attractive hybrid, the result of crossing *C. × Armstrongiae* with *C. Bowringiana*, bears erect spikes of medium-sized flowers, of bright purple colour throughout, except for a yellowish area in the throat of the labellum. Exhibited by E. Kenneth Wilson, Esq., "Cannizaro," Wimbledon.

Chrysanthemum '**Crofton Gold.**' A.M. November 24, 1936. From F. L. Dight, Esq., Orpington. A rich golden-yellow single variety with four rows of broad florets slightly curled at the tips. The flowers measure 5½ inches across and the plant appears to be of very free-flowering habit. This variety is a sport from 'Red Lincoln.'

Chrysanthemum '**Yellow American Beauty.**' F.C.C. December 8, 1936. From Mr. T. Stevenson, Hillingdon. A sulphur-yellow incurved variety of medium size excellent for market work. It is a sport from 'American Beauty.'

Cypripedium × '**Balaclava,**' '**Brigadier.**' A.M. November 24, 1936. From Lionel de Rothschild, Esq., Exbury. An elegant flower, of well above the average size. The large dorsal sepal is white with an apple-green base, and effectively marked with maroon spots on the lower half. The petals and labellum are yellowish, stained with mahogany-red. *C. × 'Gwen Hannen' × C. × 'Warrior.'*

Cypripedium × '**Kay-Kay,**' '**Sunny.**' A.M. November 24, 1936. From A. M. Wells, Esq., Chiddingfold, Surrey. Although somewhat heavily built, this flower has attractive features in the round dorsal sepal, which is tinged with rose-purple and has a greenish base. The labellum and the broad petals are reddish-brown. The result of crossing *C. × 'Atlantis'* with *C. × 'Mrs. William Pickup.'*

Cypripedium × '**Lady Mona.**' A.M. December 8, 1936. This charming addition to the genus results from the crossing of *C. × 'Grace Darling'* with *C. × 'Symphony.'* The flowers are almost uniform deep honey-yellow, the upper half of the petals yellowish, and the dorsal sepal with a white apical margin. Shown by N. Prinsep, Esq., The Boxes, Pevensey Bay, Sussex.

Dendrobium Phalaenopsis Schroederianum '**Laure Sladden.**' A.M. November 24, 1936. From Messrs. Sanders, St. Albans. This plant bore an arching spike of 13 flowers, in which the sepals and broad petals are deep-rose, while the labellum is mainly rose-crimson. *D. Phalaenopsis Schroederianum* is a native of New Guinea, and may be regarded as a geographical form of the original *D. Phalaenopsis* from North Australia.

Odontoglossum × '**Petulum**' var. **magnum.** A.M. November 10, 1936. A charming hybrid obtained by crossing the well-known *O. crispum* with *O. × 'Toreador.'* The tall and arching spike bore a

dozen large flowers in which the broad sepals and round petals are white with slight rose shading, and marked with an occasional red-brown spot. Shown by Messrs. Charlesworth, Haywards Heath.

Oncidium Forbesii var. **Measuresianum**. A.M. November 10, 1936. This Brazilian species, one of the showiest members of the genus, is, unfortunately, not an easy plant to cultivate. The present example carried an erect spike of 8 well-formed flowers, of bright chestnut-brown colour, the segments margined with golden-yellow. Shown by Messrs. Sanders, St. Albans.

Pyracantha atalantioides forma aurea. A.M. November 10, 1936. From the Director, R.H.S. Gardens, Wisley. The typical scarlet-fruited form of *Pyracantha atalantioides* is well known (usually by its former name, *P. Gibbsii*) and highly esteemed in gardens. This golden-fruited seedling was raised in the Society's gardens at Wisley, and is likely to be equally popular when it becomes as readily available.



FIG 15 A BORDER OF ANNUALS AT WISLEY IN AUGUST



FIG 19—A NEW PATH IN THE WILD GARDEN, WISLY, IN JUNE

[To face p 89.

BOOK REVIEWS.

"The Moon and the growth of Plants." By L. Kolisko. 8vo. 84 pp. with 72 illustrations and 28 graphs. (The Anthroposophical Agricultural Foundation, 1936.) 5s. 4d.

The concept that the growth of plants is affected by the influence of the moon dates from the time when astrological beliefs were a prevalent creed. The *Herbals* of Albertus Magnus in the fifteenth century, of Paracelsus in the sixteenth century and of Culpeper in the seventeenth century all bear witness to the persistence of the belief in what has been termed astrological botany. The anthroposophists may be said to be the upholders of the modern version of such ideas.

In attempting to assess the value of the experiments recorded in these pages it is essential that we should not allow our judgments to be influenced, in either direction, by our attitude towards the particular philosophy with which the experiments are associated. Nevertheless the introduction into these pages of didactic statements and philosophical tenets cannot but invite the suspicion that the interpretation is not devoid of bias however unconscious. The language employed is often not the language of exact science and the presentation of the data leaves much to be desired.

In the first series of experiments here reported batches of wheat were sown at fortnightly intervals and each grown for fourteen days so as to correspond to periods of the waxing and the waning of the moon throughout the year. Each batch consisted of eight sets of thirty plants. Unfortunately no data are furnished as to the behaviour of the different sets in each batch. No actual figures are given, but the results are presented as graphs of the average growths made, without any scale, so that no statistical analysis is possible and one cannot judge whether the differences observed are, or are not, "significant." It is claimed that the growth in general is greater with a waxing than with a waning moon. The general trend of the curves shows, as is to be anticipated, an augmented growth with the advancing season up to July and a diminishing growth during autumn, changes presumably connected with temperature though thermometric data are not given. Such curves are furnished for experiments carried out over a period of several years, all of which suggest that the effects of temperature are far more important than the differences accompanying different periods of sowing. Still in the 1926 to 1927 experiments the growth as indicated by the length of the first and second leaves during the period of waxing moon was in eight instances greater by some unknown amount than those grown during the waning periods, immediately before or after. But whether the differences are "significant" cannot be assessed.

In the later pages a number of photographs are reproduced of plants grown from seed sown two days prior to a full moon and of others from seed sown two days prior to a new moon. In many instances the plants from seeds sown just before the full moon appear strikingly more robust than the others. But here again the full data are not furnished. One may indeed hope that similar experiments will be carried out under carefully controlled conditions, but the manner of presentation here is such that despite the differences shown the results cannot be said to carry conviction since no data are furnished as to conditions which are already accepted as affecting the growth of plants.

E. J. SALISBURY.

"The Apples of England." By H. V. Taylor, O.B.E., B.Sc., A.R.C.S., with a Foreword by Sir A. D. Hall. 266 pp. (Crosby Lockwood & Son, London, 1936.) 21s.

The author sets out "to provide available information concerning the varieties growing in England to-day, and especially those that are actually listed in nurserymen's catalogues . . ." and he deals with his subject in two parts. Part I comprises the general consideration of apple varieties, including the history of British varieties, their longevity and uses, the characters employed in varietal description, the inheritance of characters and the classification of varieties. Part II occupies nearly three-quarters of the book and contains notes on nearly 600 varieties of apples with fuller descriptions of about half of them.

We admire the author's line of approach, but the task in front of him was a formidable one and we feel that it was asking too much of so fully occupied an administrator as Mr. Taylor. He has hardly been able to do justice either to himself or his subject. The chapters, for example, dealing with the characters of leaf, flower and fruit and the classification of varieties, are neither particularly penetrating nor sufficiently comprehensive in treatment. The author rightly pleads for detailed descriptions of English varieties, but he misses the opportunity to clear the ground by providing a critical evaluation of the characters used in varietal descriptions. Sufficient material is now available in papers published in this country alone to form the basis of such a survey, and the task of drawing it together would have been a worth-while one.

Part II is in effect a résumé of apple varieties offered in nurserymen's catalogues in this country, and a useful feature to the fruit enthusiast is the note against some 170 varieties that they are no longer listed by leading nurserymen. In this section also, some new information is given as to the locality of old varieties and the markets in which they are sold. Here the author speaks with the authority of his wide experience of commercial fruit-growing in this country, and we congratulate him on making such excellent use of the exhibit of local apple varieties at the Royal Horticultural Society's Autumn Show 1934. When we come to the description of varieties, comparison is naturally made with two manuals familiar to every English pomologist, and almost inevitably we find but little new information. We say "inevitably," because we doubt if brief descriptions of external characters of the fruit with occasional additional notes are of much value to the would-be namer of an unknown fruit, and we are convinced that once brief descriptions of fruits have been published, little is to be gained by repeating the attempt. We feel like J. K. Jerome's Man in a Boat, who, having read the description of numerous diseases in a medical encyclopaedia, concluded that he was suffering from all of them. In our opinion the method of Alphonse Mas offers most hope of success; *complete* and *uniform* descriptions of fruit, flower, foliage, buds, twigs and tree habit, supported by a summary of the salient features—the latter prepared by a genius of description. Furthermore, within the compass of reasonable cost, every variety should be adequately illustrated, for no description can satisfy in every particular and still be digestible. Regrettably we recognize that accurately coloured reproductions would prove utterly prohibitive in cost, but the problem of illustration could probably be met by line drawings to scale of each fruit in transverse and vertical section, supported, if funds allowed, by half-tone or line blocks of foliage, flowers and winter buds. We still hope to see a book, which by giving spacious treatment to a select list of varieties could be regarded as a contribution towards a Monograph on English Apples.

In conclusion, our criticism is of itself a measure of the magnitude of the task and of the high reputation of the author. Undoubtedly this volume will rightly find its way to the bookshelf of the pomologist and fruit enthusiast, and may be profitably read—and Mr. Taylor makes reading easy—by a wider circle of fruit growers.

"The Anatomy of Dessert." By E. A. Bunyard. New ed. 8vo. viii + 227 pp. (Chatto & Windus, London, 1936.) 3s. 6d.

This book, first published in 1928, is now issued in a cheap edition. Good wine needs no bush, and a good book going into a cheap edition is already well recommended.

"The Gardener's Diary, 1937." 8vo. (Country Life, London, 1936.) 2s. 6d.

Provides space for notes for every day and gives Cobbett's calendar of garden directions of 1827. The latter is interesting as a guide to what needs doing in the garden and for comparison with present-day methods and needs.

"Rural Roundabout." By H. Clarke. 8vo. 201 pp. (Allman, London, 1936.) 3s. 6d.

A number of notes on country topics written round the seasons.

"British Trees and Shrubs, including those Commonly Planted. A Systematic Introduction to our Conifers and Woody Dicotyledons." By H. Gilbert-Carter, M.A., M.B. 8vo. xv + 291 pp. (Oxford University Press, 1936.) 12s. 6d.

This book has been written in the interests of botanical students and garden lovers, with the view to giving them, in easily understood terms, the essential characters whereby the native trees and shrubs met with in the countryside and many of those exotics that are grown in gardens, or in forests, may be identified. The descriptions are given under family headings, under Engler's system of

arrangement. Following a description of the characters of a particular family, there are descriptions of the more important genera with a selection of the species most often found in cultivation. Botanical descriptions of species are, in many cases, followed by details of distribution and the natural conditions under which they grow. Cultural notes, however, are not included.

Most of the specific names given are those required by the observance of the Rules and Regulations governing Nomenclature, therefore some well-known names have been replaced by others that are less familiar. This is perhaps just as well, for if it is impossible to compile a list of specific *nomina conservanda*, the sooner we familiarize ourselves with the names that are to be used in the future the better.

The author, however, appears to have overlooked the rule relating to later homonyms passed at the International Botanical Congress in 1930, for he has retained such names as *Pseudotsuga taxifolia* and *Pinus excelsa*, which are actually invalid by the application of that rule. He has also retained the name of *Cedrus libanotica* for the Lebanon cedar, although Dr. Sprague went to a good deal of trouble a few years ago to explain why that name could not be used in preference to *Cedrus Libani*. On p. xii of the Introduction he is inclined to be facetious about the attempt that is being made in some quarters to limit the use of certain common names as applied to trees and timber. This is unfortunate, for the wrong use of common names causes, perhaps, more confusion amongst planters of trees and users of timber than the use of scientific names that are incorrect according to the Rules and Regulations governing Nomenclature, and certainly is of greater moment than the spelling of the familiar *Pyrus* as *Pirus* and *syvestris* as *silvestris*, about which the author is very emphatic. However, these little inadvertencies can be forgiven in a book that will be found to be very useful in the classroom, garden and forest.

W. DALLIMORE.

"The Scientific Principles of Plant Protection." By H. Martin. Ed. 2. 8vo. xii + 379 pp. (Arnold, London, 1936.) 21s.

A second edition of this excellent "review of all the armoury that is now available for the control of plant diseases" has been made necessary, not only by the demand for it but by the advances in knowledge of its subject during the past eight years. The main facts of this advance have been incorporated into what was already an excellent book. Perhaps there is less advance in actual knowledge of disease resistance and what constitutes it than elsewhere. We are apt to hear constantly repeated the statement that potash manuring confers resistance, but the grounds for the statement are rather slender. We need more experimental proof before the generalization can be accepted as valid, and we have far to go before we understand why one garden is constantly almost free from disease without the use of prophylactics, while another is overrun in spite of comparatively great expenditure upon them. We sum up the reason in "Good cultivation." What does it actually mean? Science has not yet explained it. Doubtless it is complex and doubtless art outruns knowledge, but until we know, universal health among our plants is as impossible to attain as if they were endowed with will, and that perverse. This book at least is a help, for it tells us what is known, and that is some way towards enlightening the vastness of our ignorance. Some day we shall know enough to enable us to expend less on various washes and fumigants, and doubtless garden sanitation as well as balanced rations will play no small part.

"Profit from Fertilizers." By H. V. Garner, A. H. Hoare, H. C. Long, R. G. Stapledon, F. Rayns and T. Wallace. 182 pp. (Crosby Lockwood, London, 1936.) 7s. 6d.

This handbook, one of a series dealing with agricultural and horticultural topics, is introduced in a felicitous foreword by Viscount Bledisloe, and includes on its title pages the names of distinguished agricultural pioneers as well as of experienced practical men.

In the preface we read that "Our knowledge of the use of fertilizers cannot remain static or unapplied. If it does we cannot hope to maintain fully the output of the land of Britain or justify in the eyes of the public the much-needed assistance which the government is extending to its cultivators."

The opening chapters are concerned with the elements taken up from the soil by plants and with the requirements of crops. There is little that is novel here; the old—and true—story of deficiency in "N, P and K" (nitrogen, phosphorus and potassium) is once more reiterated; the list of minor plant foods includes boron: in this respect our knowledge has not remained static and has been applied, for by addition of this element to the soil, usually in the form of borax, beneficial and profitable results with turnips, swedes and sugar beet have been obtained.

Manures available are then reviewed. In the forefront are placed organic

manures which, in addition to essential elements likely to be deficient in the soil, often carry also certain substances known to influence the growth of plants. No mention of these recent discoveries is made. The influence of organic manures on tilth and on the moisture retained in the soil is briefly outlined.

Chemicals supplying one element are subsequently passed in review, followed by compounds and mixtures containing several valuable ingredients and those termed "complete" fertilizers. The use of this adjective is a restricted one limited to the three main elements.

Horticulturists will regret that a chapter has not been written on the preparation of organic composts in elaboration of the clear, concise information supplied in two paragraphs (p. 26), and dealing with the use of sulphate of ammonia, cyanamide and the proprietary "Adco" in preparing organic manures from garden rubbish. A popular chapter by Sir Albert Howard on the application of the Indore process to our conditions would have greatly enhanced the value of this section. It is fast becoming more and more apparent that fertility and soil management on a profitable basis is concerned with much more than the N, P, K story; the part played by the organic compounds, termed humus, is often unsuspected by chemists and this is not stressed in these opening chapters. Despite the preface the tendency is not sufficiently progressive; nor yet sufficiently "conservative"—for every gardener values leaf mould.

Professor Stapledon contributes two stimulating chapters dealing with the economy of grassland, and shows how vast areas of our hillsides can be improved by the intelligent use of manures to encourage the establishment of highly desirable seedlings of clovers and grass. Dealing with the manuring of grass he points out that "the whole problem of composts demands detailed study, for of the value of such materials for grassland there can be no question." How true of lawn management! The chapters concerning arable crops are of indirect value to gardeners; the value of lime for sugar beet is well shown by text and illustration on red sandstone and acid soils; a similar effect to that on marrow-stemmed Kale of a quick-acting nitrogenous manure together with additional carbonate of lime might well be obtained in many gardens.

Dr. Wallace contributes a thoughtful chapter on the manuring of fruit trees; his experiments on the effect of mineral deficiencies on fruit trees and also his observations on the relationship between the chemical conditions of the soil and the keeping quality of fruit in modern cold and gas storage are too well known to need repetition here. Yet how slow are many growers to apply this knowledge to other similar trees visibly suffering, as so many ornamental cherries and lilacs are. His chapter deals specifically with apples, plums, red and black currants, gooseberries, and strawberries—a chapter for every gardener.

There follows another chapter of direct interest to gardeners, dealing with market garden and flower crops. Far too few experiments have been carried out in this country on manuring vegetable crops; the author has to draw information from American trials in certain instances; with flowers the reliable experiments are even more restricted to a few species in one locality. The present chapter will prove helpful to many, but the reproach remains—the English experiments are few and the best work has perhaps been done by growers for their own ends. It is important that the reader thoroughly grasps the author's modern use of ratios; unlike many others, he uses a ratio 1-2-3 to express the proportions of the nitrogen, soluble phosphate, and potash in the mixture. It does not denote that the mixture contains twice as much superphosphate and three times as much sulphate of potash as it does sulphate of ammonia, as many gardeners, and others too, might expect from the previous use of similar ratios. The declaration of the percentage of nitrogen, phosphate and potash that is now obligatory and appears on all containers is of the greatest value in this as in other connexions; it simplifies all the calculations. The author no doubt realizes that even to-day many able and successful growers prefer to pay for a mixed fertilizer rather than work out sums "of the rule of three." In this chapter the author shows the actual expenditure and profits involved in certain instances. The section dealing with flowers is disappointingly short, but for this no blame may be attributable to the writer. The remedy is to encourage horticultural institutions to make the desired useful experiments from which information can be gathered.

The book concludes with useful tables and notes on the valuation of manures and an efficient index. The photographs are very good. In a work of this kind it is most difficult to avoid some repetition, as is seen where lime and liming are mentioned by each writer. The individuality of the authors is not submerged in any desire for an even quality throughout.

We recommend the book as a statement of the advantages and profits to be gained by the addition of N, P and K fertilizers—it rarely goes beyond that—it clearly succeeds in its demonstration that "it pays to fertilize."

M. A. H. TINCER.

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TREWITHE, CORNWALL.

By GEORGE H. JOHNSTONE.

IN order to compile a brief story of one's garden one should presumably open the first chapter under "Genesis," but to make it complete the last will have to be under the heading of "Revelation," if within that term can be included the recognition of one's horticultural incompetence and the limitations of one's garden.

Genesis then : A house enclosed on three sides by a wood planted early in the eighteenth century with a mixed planting of soft- and hardwoods and under-planted since with laurels which have grown and swollen, fostered by accumulated leaf-mould and doped by the age-long ministrations of generations of rooks.

The trees, mostly beeches, have clipped the edges from the lawns and have extended grasping hands to clutch the sunlight from the windows of the house and to rob a small garden, perhaps a quarter of an acre in extent, separated from the house by a backyard.

What purpose the small garden originally served it is rather hard to guess. Surrounded by a brick wall, it was then—in 1904, when gardening began here—in part surrendered to the laundry-maids as a drying ground, the colour scheme being dependent upon the washing for the week. What of it was claimed by the gardener was used for fruit-growing—peach trees were crucified along the walls and a row of fig trees occupied one end of its parallelogram. But before taking this in hand—a garden for which the destiny was already obviously shaped—it was necessary to take an axe and claim some air and light from amongst the trees, first for the house and those that should live in it, and then for the plants that must share the fortunes of the owner.

The clearing of the trees as it was done left a very rich and very

acid overlay which covered a soil of loam, clayey for the most part, and of varying depth above a clayey shale.

The whole site being flat and standing on a hill some ten miles from the sea to north and south, all opening out must be done with shelter ever in the improver's mind.

The first plants which found a place here had caught the eye of the incipient gardener at some show in London—*Rhododendron javanicum* and *Lotus peliorhynchus*. They shared (for a limited period) one of those sore places that are apt to worry the beginner, where a big beech tree seems to have claimed more than its share of the lawn. We have reached Exodus now!

Next, a hundred *Rhododendron arboreum* hybrids were purchased, and these formed the starting-point for all future planting. Those that are left, maybe a dozen, still claim a place against modern improvements, and still bear the label 1905. These coming early "pinched" the best places and have grown accordingly, forming now a good show of rather second-class material standing in clearings made in the wood, and thus mark where the foundations were laid of the garden as it is to-day.

Development has demanded a gradual increase in the number of clearings cut, while maintaining a strong fortification of trees and laurels round the perimeter, and within this a second line of hedges and wind blocks has been formed of better things.

At the end of the wood, itself about 15 acres, farthest from the house is an old quarry pit, reported to have been the cockpit which formed a proper adjunct to country life at the date when this house was built. This cockpit has been terraced and buttressed and planted with Alpine Rhododendrons, Meconopses, Primulas, and especially Japanese Azalea species, while at one end stands a large plant of *Rhododendron Aucklandii*, the first of innumerable gifts of plants received from my neighbour, Mr. J. C. WILLIAMS.

Having thus taken a survey of the general conditions, we may start from the south side of the house and make a more detailed examination. From the house the lawn extends southwards for about 200 yards and is planted on either side, but as we shall reach this from the other end we can more conveniently start westward, and here planted against an extension wall of the house is the first plant worth inviting attention to. It should be put this way, for this is no "fife-and-drum" plant, being tiny of leaf and the flower insignificant and green; but the scent is delicious—*Clematis marata*.

Following the same path we reach the entrance to the small walled garden already referred to—mostly given up to herbaceous plants and roses (figs. 20, 21), and by passing through this we emerge at the end, where at the back of this garden wall is a small space for nursery plants. Planted against this wall is *Mitraria coccinea*, 8 feet high and 7 feet across. This makes a fine show when in flower but, having grown out so far over the path as to be a nuisance, the barber has had to be called in to curtail its activities. Here, too, is *Gordonia anomala*—

what a pity that a flower of such purity of whiteness should be fated to bloom at a time when the weather conditions are so detrimental!

Returning along the garden wall by a path with a group of *Cordylines* on the right—and why do we not see more of *Cordyline indivisa vera* with striking foliage and seemingly as hardy as the old cabbage-tree, though not so long lived?—we turn to the right, a corner susceptible to the east wind, to obstruct which *Griselinia littoralis* has been planted as a break. No wind ever seems to shake the foundations of this plant or even to be able to strip the leaves.

The soil on either side of the path we are now on is very rich in leaf-mould and appears particularly suited to *Gaultherias*, the best of which in this garden is undoubtedly *Gaultheria Forrestii*, a compact shrub some 3 feet high, sending out shoots from near the base, which in the summer are festooned with white flowers standing out as a contrast to the dark foliage. Unhappily there are other *Gaultherias* under this name, and though one of them at least is included here, it bears little resemblance to this fine plant.

Eucryphia glutinosa (pinnatifolia) (fig. 22) is very good in this border, and adjoining it are *E. cordifolia* and *E. × Nymansay*—the latter, many years the youngest of these three, has already overtopped them and this year (1936) is a truly magnificent sight, for which I am indebted to Colonel MESSEL who raised it.

Nearby is *Michelia doltsopa*, and a little farther down the path is a plant of *Clethra arborea*, which is one of the first plants put into this garden and is now some 25 feet high and 72 feet round the perimeter. This, too, when in flower is a monumental sight if it does not receive a check from the frost in the spring.

This border is backed by the old wood (the Rookery) from which the garden has been carved out, and here in a mixed planting of Spanish chestnuts and beech trees is a large group of *Hydrangeas*, all of which are of a deep shade of blue, with the exception of *Hydrangea Sargentiana*, which has attained a height of 14 feet (fig. 23). This clump of *Hydrangeas* is a refreshing sight when the evening light in August develops an intensity of colour amongst the shade of the trees above. *Hoheria populnea* seems to enjoy the rather heavy soil here where the trees do not overhang, and flowers magnificently in mid-autumn.

We turn to the right again, following a path with high laurel hedges on either side, screening bays which have been cleared of trees and planted with *Rhododendrons*, etc. There is a good plant of *Nothofagus Moorei* in the first of these bays, though probably the most striking plant here is *Rhododendron Hodgsonii*, which is amongst the best barked of all *Rhododendrons*.

Adjoining this bay and farther along the path is another, of which the outstanding feature is a hybrid *Rhododendron* raised here, 'St. Probus,' an intense crimson, set off by 'Susan,' probably the best mauve *Rhododendron* ever raised, and given me by the late Mr. P. D. WILLIAMS, *R. Morii* and several hybrids.

The back of this bay is made with a screen of *Schima khasiana*, and although this does not flower until September it is worth having both as a screen and as a foliage plant. *S. argentea* is also grown here, but has not yet flowered.

We now turn left into the bays on the other side of the path down which we have come, and passing under some of the *Rhododendron arboreum* hybrids planted in 1905 we come to a group of *R. sinogrande*, which is certainly amongst the best bits of planting done here (fig 24). Very little wind or sun invades their laurel screen, and *R. sinogrande* has taken full advantage of the rich soil and the cool shelter. The largest of these plants is about 72 feet round the perimeter.

Near here, but in the next bay, is *Gevuina Avellana*, some 36 feet high, and here too is *Schizophragma integrifolia*, which however has met with some misfortune, owing to the larch tree up which it had climbed some 30 feet having been blown down in the gales of last winter and the roots of the *Schizophragma* being thus ruthlessly torn out of the ground. It has been replanted and is growing well amongst the laurels, but can never again give the wonderful display it did when in full flower the whole length of the larch stem.

Proceeding through this bay we join one of the main paths again, passing at this point *Rhododendron Loderi* and a group of large plants of *R. Augustinii* with behind them *Magnolia grandiflora*, interesting because it is a seedling raised from one of those at the Alhambra. *Acer Hookeri* too claims notice hereabouts with its red young growth.

At the point we have now reached there is a good view of *Drimys Winteri* (36 feet), grown here as a screen to another bay cut out of the wood. The other side of this bay, and adjoining the path, is screened by a hedge of *Tricuspidaria lanceolata*, shading a group of *Rhododendron Weyrichii*. Surely this latter must be amongst the most unusual of colour mixtures which Nature has chosen, four petals of each flower being salmon and one magenta; and yet they seem to blend into a charming pink, especially at night. The *Tricuspidaria* hedge is 29 feet high and forms a first-class wind screen. It flowers well, but somehow the dark foliage seems to foil the splendour of the blossom.

The adjoining bay is hedged on the one side with *Drimys aromatica* (13 feet) (fig. 25) and on another is *Lonicera xerocalyx* which, climbing the laurels (and anything else it can get hold of), forms a complete block to any wind, but it is much the same as wire to train back with a hook.

The laurels in this garden grow to a great height, and then if not cut back bend slowly to the ground. At one place there is a sort of tunnel amongst the laurels, here left to grow into a gaunt and tangled archway forming the junction between three bays, where one passes under laurel stems which are thus bowed with age. One stem measures 4 feet round the bole at 8 feet from the ground, and from this point to the end measures nearly another 50 feet.

An interesting young tree growing well not far from here is *Aextoxi-*



FIG. 6. IHI ROSI GARDEN AT TRIWITIN LOOKING WEST



16 -1 ROSE GARDEN AT TRIVITHEN FROM THE SUMMER HOUSE

cum punctatum, and passing this we reach another bay, where perhaps the most remarkable plant is *Prunus campanulata*, nearly 40 feet high. It flowers well all over and then gives a fine glow if seen with the sun behind one. Here, too, is a plant of *Trichospermum Weimannianum*, over 30 feet high. This also flowers profusely every year and is probably a short-lived thing in the rich soil.

Some use has been made of the better barked birches in this garden, and there is a good one in this bay—one of FARRER'S, collected in Kansu. The peace-loving man hesitates to give a name to a *Betula*, so it is included here as 'Kansu birch'—safe ground this, anyway. *Acer Campbellii* var. *yunnanense*, though not a first-class plant, is good in the young growth and makes a light shading over a group of *Rhododendron lutescens* \times *Harrovianum*, while another shade plant which occupies a place here is *Quercus incana*, attractive when the pink young growth decorates it in the spring.

Nearby is the entrance to the pit, already mentioned above, gained by descending a few steps to a sunk fence, which no doubt originally marked the boundary of the wood which now stretches beyond this dike for some yards. The sunk fence is stone-faced on one side, and the other side rises as a bank on which the *Meconopses* do particularly well in the rich leaf-mould they have inherited, *M. simplicifolia* var. *Baileyi* renewing itself fairly freely from seed; while along the path at the foot of the bank is a planting of mixed *Primulas* to tone in with the blue poppies.

The sunk path opens out on to the pit, which then falls in a southerly direction from the level of the entrance, and this in turn is about 8 feet below the level of the path forming the boundary of the pit on the north side. The sides of the pit on the east and west are terraced and buttressed and carry a heavy coat of moss, while the terraces on either side are planted with the low-growing *Rhododendrons*, and the medium-sized ones, such as *Rhododendron orbiculare*, occupy the upper circle.

The centre of the pit has been built up from the lower level to that of the higher ground where we entered, thus forming a platform with walled sides which are used for planting things calculated to enjoy this sort of situation.

At the south end tree-ferns (fig. 26) screen an abrupt slope topped by a high laurel hedge. On this slope, which consists of deep leaf-mould, *Meconopses* do well. At the north end a gradual flight of stone steps leads from the pit to the higher ground again, and hereabouts some of the Japanese *Azaleas* are planted, and of them *Rhododendron Albrechtii* undoubtedly has pride of place, especially the dark form, which flowers regularly, and when in flower gives perhaps the best flower show of any shrub in the garden. *R. pentaphyllum* is also a lovely thing, but comes a bit too early. When we get the right year for it, the rose-pink flowers are a welcome refresher to an eye hungry for colour before spring rings up the curtain.

Another *Azalea* species which year after year attracts great

admiration is *R. tosaense*—a 7-foot bush being quite smothered with its tiny mauve flowers (fig. 27).

Having reached the top of the steps we follow the path back to where we entered this part of the garden, and passing the pit below us on our right, on the left a plant or two of *Corylopsis platypetala* and *Azara lanceolata* give colour and effect, while for a decidedly distant future *Magnolia Sargentiana* and *M. Campbellii* are also planted here, so that some day they will stretch out their flowering branches to overhang the path and the edge of the pit beyond it.

The next bay through which we pass is given up for the most part to *Rhododendron eriogynum* and *R. crassum*, and there is here too a *Magnolia rostrata* which seems to have larger leaves than any other planted in this garden. Another good tree here is *Acer Davidi*, which produces its best effect in the autumn when the leaves are the colour of pale orange, the bark green and the branches festooned their entire length with brown seeds. *A. laevigatum* is growing well here, though it is not a spectacular tree.

From this point we can make our way on to the lawn (fig. 28), reaching it at the end farthest from the house, which end has been planted for the purpose of obtaining autumn colour. This in Cornwall is not so easy to attain as on limestone, or in other parts of the country where early frosts lend their aid in attaining it.

It is hard, indeed, to award a prize for autumn colour to individual plants. The Japanese Maples, some of the Thorns, Cornus, Fothergilla and Enkianthus seem to vie with each other to produce the greatest effect; while the berries which the birds leave alone (and it is not many that they disdain) bring another note to the concert. *Viburnum betulifolium* (fig. 29) does this for us here, and every year produces an avalanche of scarlet berries which can be seen from the windows of the house, a hundred yards or more away, and these berries, at their best in late September, remain on the plants until the daffodils begin to bloom in the spring. It is fair though to warn those who may be tempted to try this truly magnificent plant that it takes many years before it produces fruit. It is so outstandingly good that a second group was made of it elsewhere in this garden, but impatience intervened, and after ten years they were given to a friend, who removed them in a lorry and is still awaiting compensation either from the donor or from the Viburnum. For colour *Cornus florida rubra* is a great success both in spring and autumn.

A plant near here worthy of mention is *Cladrastis sinensis*, though one seems to have to wait for a long time before one gets a dividend from this investment, unless one can count the foliage as such, for it is certainly very beautiful.

Reevesia is a good July flowering small tree, and is well clothed most years with its rather curious white flowers. There is a plant of *Idesia polycarpa* here just short of 40 feet high, which used to be a good sight when in berry in the autumn, but unfortunately the only male plant of this tree in the garden was blown down some years ago and

it is hard to replace, as one has to wait for some years before being sure that one has the right sex.

Farther along the lawn there is a good plant of *Magnolia Sprengeri diva*, a seedling kindly given to me by Mr. J. C. WILLIAMS from his plant at Caerhays, while on the opposite side of the lawn is a form of *M. Campbellii* (*M. mollicomata*), the young growth of which is much the same colour as *Prunus cerasifera Pissartii*, while the leaves are larger and rounder than those of the type.

We have now reached the house, and looking back down the lawn one gets an impression of colour from the Rhododendrons planted on either side, interplanted with various other things and shaded somewhat by the white-barked birches to give something of an avenue effect. An unforgettable sight is that day in May 1935 when every plant was doing its best to contribute colour and we had a slight fall of snow, no frost but just a white carpet instead of green.

This, then, completes the garden round, though there are some parts and some plants not visited. There is one advantage in writing about one's own garden, that one can omit mention of one's failures—failures due to ignorance, excessive zeal, rabbits, and what seems like pure misfortune; but the plants which have survived all these do much to cheer one on to further efforts and to remind one of the many friends who have contributed to what one has attained, and especially to teach one the lesson that he gardens best who ascertains early those things which will thrive in his own garden rather than he who strives for those plants which Nature intended to put out of his reach.

SCIENCE PROGRESS APPLIED TO HORTICULTURE.

By M. GEORGES TRUFFAUT, M.C., F.R.H.S.

[Read October 15, 1936; the Lord ABERCONWAY, C.B., V.M.H.,
in the Chair.]

YOUR invitation to summarize the latest work in horticultural research I accepted with the greatest pleasure. All the more so, because French horticultural laboratories are working on parallel lines with those adopted at Rothamsted, East Malling, Cheshunt, Long Ashton, and other famous British research stations.

No progress in agriculture and in scientific horticulture is at present possible without co-operation in various countries, and I must here acknowledge the high esteem in which the whole world holds the very great work achieved by scientific horticultural researches in the British laboratories.

In order to open new vistas, horticultural researches, as in all scientific work, urgently require the assistance of the methods used in other branches of science.

From the beginning of my researches on the influence of electricity on the vegetation of plants I saw the necessity of having exact information regarding electrical phenomena, questions of wave-length, electrical measurements, general physiology of plants, electro-chemistry and biology.

The study of plant protection against fungi and insects made in my laboratories has led us to utilize the technique of the dye-stuff and drug factories.

The various pharmacodynamic theories, especially the theory of narcosis explained by OVERTON and MEYER, were of the greatest help for the study of fungicides, insecticides, and for the use of organic dyes.

Our researches on plant nutrition have led us to a special study of soil microbiology and of partial soil sterilization. Our experiments opened new views on the relations existing between soil bacteria and plant nutrition. This general knowledge requires learned and skilful technical co-operators.

To-day I shall try very simply, without going into unnecessary details, to explain modern attainments in feeding fruit-trees, as an example of rational nutrition. Next I shall give my views on modern fungicides, insecticides, and on recent progress in weed-killing. To conclude I shall speak of the problem of microbiology as affecting plant-feeding.

Manuring the soil was formerly summed up in three main lines :

Nitrogen produces growth.

Phosphorus produces fruit.

Potassium produces quality and colour.

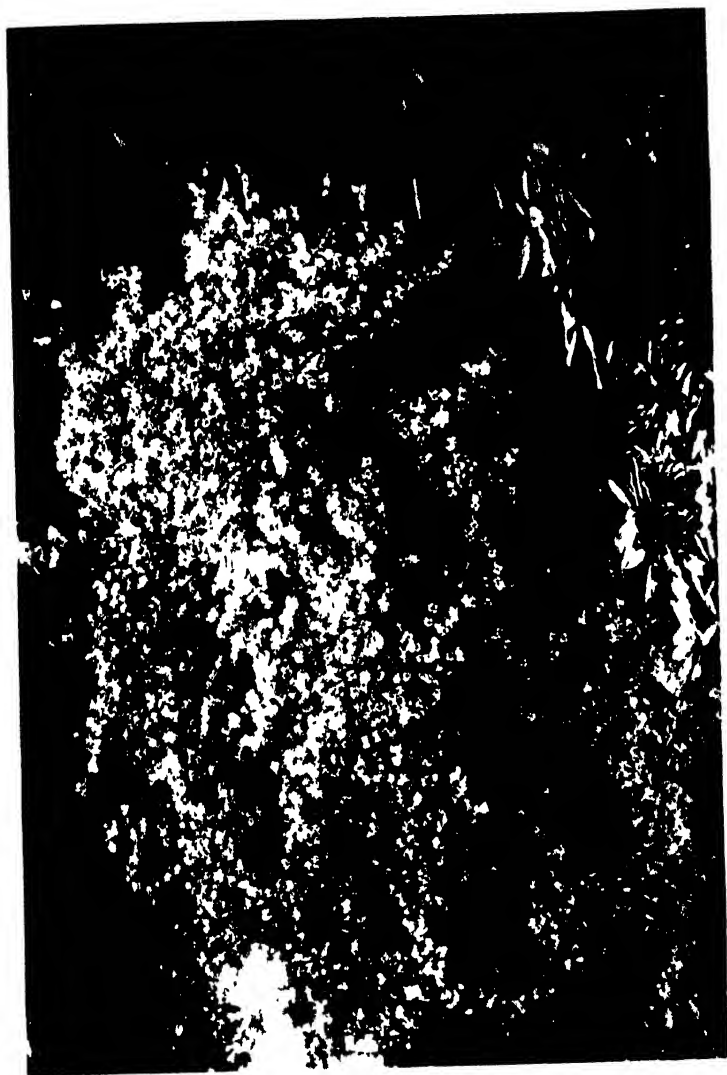


FIG. 22 EUCRYPHIA GLUTINOSA (PINNATIFOLIA) AT TREWITHEN

10 *face p 100.*



FIG. 3. *HYDRANGEA SARCOCOLLA* AT TRIWITIN.



FIG. 24 RHODODENDRON SINOGRANDE AT TRIWITEN



FIG. 25 DRIMYS AROMATICA AT ERIWIHEN

We now know that this over-simple scheme is unreliable. The nutrition and growth of plants depend simultaneously on the interaction of these three elements.

Formerly the practical difficulty of such an investigation on rational manuring was very great, because phosphatic fertilizers were insoluble (e.g. Thomas Slag), or when soluble, were united with the calcium ion.

The practical experiments made by GRANDEAU with Thomas Slag afford a good example of the difficulty of such investigations. GRANDEAU said: "My experiments were made on old apple and pear-trees, which obviously lacked mineral nutrition. I took away all the earth around the trees. The hole thus formed was again filled up with earth and slag. This treatment was completed in the following spring by watering the trees with a solution of sodium nitrate and potassic salts. After the first year the bark was less rough, and the fruit had a better appearance. At the end of the second and third year the bark became glossy, the leaves had no blackish spots and the fruit scab had disappeared." *

GRANDEAU's method never became a general one, because of the difficulty of applying it.

The various investigations made on manuring trees in Europe had no positive results. Sometimes it was even noticed that manuring decreased the crops. This unexpected effect was principally due to the application of casual formulae not adapted to the needs of the plant. Here I must state that there exists not only one formula of a complete artificial fertilizer, but numberless kinds of such compounds, many of which are no good.

Dr. WALLACE (University of Bristol) summed up the results of experiments † made before he himself began his remarkable study of the nutrition of trees thus: "Previous to 1920 the number of comprehensive manuring experiments on fruit crops, carried out in the country, was extremely small; the only investigations of note being those of BEDFORD and PICKERING at Woburn. Nor had the subject been considered to any extent in European countries."

Since 1920 important progress has been made in the manuring problems in England.

At Long Ashton the problems of fruit tree nutrition have been intensively studied by laboratory and pot-culture methods, as well as by field experiments. WALLACE and his co-workers have qualitatively established certain facts of great value.

(1) Potassium deficiency is the most important manuring item in fruit-growing.

(2) Problems relating to the use of nitrogenous fertilizers are of great importance, especially for dessert varieties.

(3) Problems of phosphatic manuring appear to be of much less

* GRANDEAU. *Fumure des champs et des jardins* (Paris 1896).

† Journ. Pomol. and Hortic. Science, 4, p. 177 (1926). See also J. RUSSELL. *Artificial Fertilizer* (London, 1931).

importance than those relating to the use of nitrogenous and potassic manures.

(4) Soil acidity has not proved to be important.

(5) Fruit yield and quality may be greatly altered by manuring with nitrogenous and potassium salts.

The work at Versailles, with my collaborator Dr. PASTAC, was an attempt to get not only qualitative notions, but also exact quantitative data, regarding the right proportion of nitrogen, potassium, and phosphorus, which must exist in normal complete manure for fruit trees.*

During three years we tested on fruit trees, on Potatoes, and on Dahlias a great number of different complete fertilizers.

Our methods of investigation have been quite different from those previously followed. Instead of an arbitrary manner of varying the proportion of nitrogen, phosphoric acid, and potash, we adopted a rational basis, viz. the proportion of the atomic weights.

The weight of nitrogen is equal to 14 units.

„ „ „ phosphorus is equal to 31 units.

„ „ „ potassium is equal to 39 units.

The weight of phosphoric acid corresponding to 1 atom of phosphorus is 71 units.

The weight of potassium oxide (K_2O) corresponding to 1 atom of potassium is 47 units.

The simplest atomic proportions may be : 1 atom nitrogen, 1 atom phosphorus, 1 atom potassium, or 14 parts nitrogen, 71 parts phosphoric acid, 47 parts oxide of potassium.

This proportion is equal to 1 per cent. nitrogen, 5 per cent. phosphoric acid, 35 per cent. oxide of potassium.

All variations in the proportions of nitrogen, phosphoric acid, and potassium should always be in relation to their atomic weight.

When we choose 1 atom nitrogen, 1 atom phosphorus, 1 atom potassium, it represents 1 per cent. of nitrogen, 5 per cent. of phosphoric acid, 35 per cent. of potassium.

For 2 atoms of nitrogen, 1 atom of phosphorus, 1 atom of potassium, we have 2 per cent. of nitrogen, 5 per cent. of phosphoric acid, 35 per cent. of potassium.

1 atom nitrogen, 2 atoms phosphorus, 1 atom potassium, is equal to 1 per cent. of nitrogen, 10 per cent. phosphoric acid, 35 per cent. potash.

1 atom nitrogen, 1 atom phosphorus, 2 atoms potassium, is equal to 1 per cent. nitrogen, 5 per cent. phosphoric acid, 7 per cent. potash.

These data clearly show typical manure formulæ, which always are in our experiments in proportion to atomic weights.

Nitrogenous compounds after oxidation and phosphoric acid are

* G. TRUFFAUT and I. PASTAC. "Les engrais chimiques modernes." *Revue de Chimie Ind.*, p. 2 (1935). I. PASTAC. "Interpretations Chimiques des Formules d'engrais complet." XIV Congrès de Chimie Ind., 1934, No. 189 (Paris, 1935).

anions (acid parts). Every atom of phosphorus and of oxidized nitrogenous compounds requires to be combined with 1 atom of potassium cation (basic part).

The simplest well-balanced atomic formula is therefore : 1 atom nitrogen, 1 atom phosphorus, and at least 2 atoms potassium.

Our field experiments have established that the proportions, nitrogen, 4 per cent. ; phosphoric acid, 20 per cent. ; potash, 30 per cent., gave optimum results.

The atomic relations of these proportions are : nitrogen 1 atom, phosphorus 1 atom, potassium 2 atoms.

Consequently field experiments have confirmed our theoretical hypothesis.

This is a new departure in the manuring process ; it explains the importance of great quantities of potash for an effective complete manure. It explains the lowered efficiency of nitrogen, when the proportion of potash is insufficient.

In the course of 1935 we experimented on ' Dikke Muizen ' Potato with many different atomic manure formulae. All the results coincided with our theoretical prognostications. The following data illustrate the necessity of sufficient quantities of potash.

No	Fertilizer.			Crops
	Nitrogen	Phosphoric acid	Potash	
	%	%	%	
24 bis	0	0	0	2970
30 .	4	20	0	2510
21 .	4	20	14	2920
22 .	4	20	28	5500
23 .	4	20	40	4760

This experiment clearly shows that when a complete manure is wrongly balanced the crop may be smaller than on the check plot.

Another experiment with ' Dikke Muizen ' Potato revealed a very interesting effect of the calcium ion on complete fertilizers.

No	Check Plot.	Nitrogen.	Phosphoric acid	Potash.	Crops.
		%	%	%	
24 bis		0	0	0	2970
	Complete fertilizer with calcium ion	4	20	30	2900
	Complete fertilizer without the calcium ion gave	4	20	30	5500

The introduction of soluble calcium into a complete fertilizer quite abolished the favourable influence of the manure. It is generally true that the introduction of carbonate of calcium into an acid soil will improve the crops.

Carbonate of calcium eliminates the acidity of the soil. This favourable result is due to the suppression of the noxious influence of the soil acids, but not to the introduction of calcium ion.

Physico-chemical calculations have proved that the roots of the plants are able to absorb and accumulate even extremely small quantities of calcium, just as marine algae do iodine.

Very seldom is any soil completely devoid of calcium.

Recently Professor LEGATU of Montpellier * stated that even in soils extremely poor in calcium the liming of vines had no beneficial effect whatever.

LIEBIG, who considered it important to analyse ashes, showed that the percentage of calcium in the grain of cereals was unchanged by liming, though the percentage of calcium in the straw was considerably increased.

This assertion, made so long ago, proved that calcium is not such an important factor for the growth of plants after germination as potassium and phosphorus are. Moreover, the absorption of a great quantity of calcium is undesirable. In plants calcium must be rendered insoluble by organic acids and is thus stored in the leaves. Only a small quantity of calcium is wanted for the formation of grain or fruit. The calcium ion buffers the excess of activity of the potassium ion.

Professor WALLACE has proved that fruit trees which have received a complete nutritive solution containing calcium lose their leaves about the middle of August; whereas fruit trees growing in a solution without calcium preserve their leaves till the frosts of autumn.

In my nurseries at Versailles we observed that Roses receiving a complete fertilizer without calcium salts also preserved their leaves till the frosts.

In my experimental fruit garden at Grosrouvre (Seine-et-Oise) I noticed that Raspberry bushes, and even cabbages, having received fertilizers without calcium, had at least double the growth compared with those which had received the same manure but had also been limed.

A small quantity of calcium is probably necessary for the normal growth of plants. Too great an accumulation of calcium within the plants is liable subsequently to call forth the phenomena of age.

It is well known that calcium in the animal world is necessary for young beings. It may become dangerous for old ones, causing sclerosis of the arteries. Physicians use iodine, which causes the elimination of calcium and the diminution of the sclerotic phenomena. However, the elixir of life, which once MEPHISTO proposed to FAUST, has not yet been found. Several new soluble fertilizers, absolutely devoid of the calcium ion, may be said to be real elixirs of youth, "Eau de Jouvence" for fruit trees.

These fertilizers, containing large amounts of potassium, produced a real washing out of the lime which had been absorbed and stored in

* LEGATU. *Comptes Rendus Ac. Agric.* (1936).



FIG. 26. IRU LIRNS VI IRUWITEN



FIG. 27 RHODODENDRON TOSAENSE AT TREWLIHEN.

the tissue of the plants. I have not sufficient time to deal to-day with the mathematical theory of this phenomenon. This theory is founded on the work of Professor DONNAN of London University. Before the war DONNAN studied the equilibrium of semi-diffusible salts.*

Dr. PASTAC, the chief chemist of my laboratory, has applied DONNAN's theories to the study of plant nutrition.† From a practical point of view, it is important to state that it is now possible to rejuvenate old fruit trees by using suitable fertilizers. They must be concentrated, soluble, free from calcium, and rich in potassium. The probable process of this phenomenon is the reverse of those observed during the growth of young plants. In the beginning of its life the young plant, rich in potassium, is able to absorb and store important quantities of calcium even when growing in a soil very poor in calcium. The absorption of calcium ceases only when the potassium reserves are exhausted.

The reverse process must be started when we attempt to rejuvenate an old tree. The nutritive solution of a soil rich in potassium will extract the calcium from a senile old tree and replace it with potassium, till a certain equilibrium is established. The introduction into the soil of additional quantities of fertilizers will facilitate this exchange.

It is easy to understand that the presence of calcium in a soil solution will counteract this exchange. This was the reason why the former fertilizers, relatively poor in potassium and rich in soluble calcium, never produced any rejuvenescent effects upon the trees.

Now, by a very simple method you can change old trees into young ones. Spread the proper manure broadcast, 1 or 2 ounces to the square yard. It is not necessary to dig new solubles into the soil. The end of winter is the best season for this work. This manuring operation may be repeated in May-June. The work must be completed by suitable prunings and sprayings. Winter pruning may be replaced by summer pruning. The so-called 'Taille Lorette' is now well known in England and is suitable for amateur gardens, in which sufficient time can be spent on every tree. Whilst pruning, it is important to disinfect saw and pruning-knife by dipping them into a disinfectant solution. This precaution will prevent numerous infections. Plant surgery must be as aseptic as any other surgery.

We shall now examine the modern problems of protecting plants against fungi and insects.

The winter-washing of trees is an important feature.‡ Its advantages are :

(1) The fact that this work is easy. The spraying may be done any calm day during winter when there is no frost.

* DONNAN. *Z. Electroch.*, xvii, p. 572 (1911).

† G. TRUFFAUT and I. PASTAC. "Chimie des engrais; Sels semidiffusible." XV Congrès de Chimie Ind., 1935, No. 126.

‡ G. TRUFFAUT and I. PASTAC. *Chimiotherapie des maladies des plantes. Rev. Ch. Ind.*, xli, No. 781 and 782 (1932).

(2) The absence of leaves and fruit makes the work easier and more economical than spring or summer work.

(3) Winter washes may be, at the same time, insecticidal and fungicidal, which is impossible in spring or summer.

The effects of winter spraying are so obvious that they prove best of all the desirability of treating the trees.

Lime is the oldest winter wash. It was used as far¹ back as the time of the Romans. Its present use is a proof of the power of tradition.

About a hundred years ago lime-sulphur was invented. It was prepared by boiling quick lime with sulphur. It is a very active winter wash, but it is dangerous for the skin and perforates copper sprayers.

At the beginning of the twentieth century a 2 per cent. formol solution was widely used in France for winter spraying. Formol dilutes quickly in water and does not spoil the spraying machines. A formol solution is a very weak insecticide, but has a powerful tanning action. The bark of the twigs and branches treated with formol becomes hardened and expands with difficulty. The following year the bark tears longitudinally, generally at the bases of the lateral twigs. These crevices become the favourite shelter for scale insects. The tar-oil winter wash is superior to all other washes formerly used. The tar-oil winter wash, or carbolineum, is composed of anthracenic fractions of coal tar, and of various wetting products.

The antiseptic power of several organic dyes has been known for years, but before our researches dyestuffs had never been utilized against fungi and bacteria. The theory of their application was elaborated in my laboratory in 1929-30.* Our new methods enabled us to select the most active dyes for horticultural use. Winter spraying with synthetic dyes and wetting agents, known as "Elgetol," is now widely utilized in France. Its efficiency is far superior to all other winter washes.

In fact lime-sulphur corrodes the epiderm of parasites—insects, their eggs, fungi, etc.; and its polysulphides and nascent sulphur act as a toxic agent. Carbolineum acts as all other oils of "quick breaking" emulsions do. The presence of a naphthol compound and of anthracene in carbolineum explains its fungicidal and germicidal activity. Unfortunately these compounds may damage the buds at the end of winter. "Elgetol" has neither the causticity of lime-sulphur, nor the noxious influence of carbolineum on the buds. "Elgetol" is able to penetrate the epiderms and is the best ovicide. Its solution passes through the cell-walls and flocculates the chromatine of the nuclei.

The yellow solution of "Elgetol" is slightly alkaline. The metabolism of the cells is thus paralysed and the parasites die, so that every parasite that has been coloured is killed. The colouring matter does not possess the undesirable tanning capacity of formol. The tree

* G. TRUFFAUT and I. PASTAC. C. R. Ac. des Sc. (1929); *ibid.*, Chimio-therapie des maladies des plantes. Nouvel emploi des matières, col. xxxix, p. 37 (1930). I. PASTAC, Ch. et Ind., xxvii, No. 3 bis 859 (1932).

which has been sprayed with this dye grows freely and its bark breathes well.

The spring treatment must be effected with Bordeaux mixture and with arsenic. Bordeaux mixture is the best compound so far known to prevent the infection of vine and fruit trees by scab, downy mildew, and other endogenous parasites.

It is interesting that in England and other countries (except France) growers are accustomed to prepare the Bordeaux mixture by pouring the solution of copper sulphate into a suspension of lime. PICKERING's researches at Woburn * have brought a new confirmation of this method, which had been proposed by PIETRI in France in 1883, but was at that time neglected. The correct method of preparing Bordeaux mixture has now again been widely introduced in France.†

Bordeaux mixture may be used with arsenic, which kills insects. Arsenic was used as a toxic element even in ancient Greece. Theophrastus recommends powdering the plants with sulphur of arsenic. At present the chief arsenical compound used in gardening is arsenate of lead. This salt was discovered by KLAPROTH in 1802 ; but it was not until about a century later, in 1892, that MULTON, a chemist of the American Gypsy Moth Committee, suggested its use for the spraying of trees. Lately arsenate of lead, or "gypsine," has new competitors, namely, arsenate of manganese (Manganar) in America, and arsenate of aluminium (Arsactif) in France. The particles of the Arsactif product are electro-positively charged, whereas in the leaves of the trees the electrical charge is negative. Therefore an attraction fixes the arsenic particles and they remain for a long time on the leaves.

Against the codling moth attempts made to replace arsenic by the harmless Rotenone have, so far, given no definite results.

The utilization of oils for the destruction of biting insects was most successful. Emulsified oils are able to kill the eggs of insects. Arsenic, however toxic, is not an ovicide ; so oils are used in addition to arsenical sprays, either separately, without the latter, or combined with nicotine. Experiments made in different countries (Australia, France, Africa, etc.) have proved that the emulsified nicotine oil reaches the codling moth as well as the arsenic sprays do.

The emulsification of oils can be made with soap (fish-oil soap, potassium ammonium soap), or with various new synthetical wetters, such as are used in the dyeing industry. Now it is possible to get emulsified oil completely free from electrolytes, the addition of which renders the Bordeaux mixture or arsenical sprays dangerous, because they may then damage the foliage and the bark.

The struggle against aphides, caterpillars, etc., by means of "Contact Insecticides" depends mostly on the quality of the "wetting agent," which is incorporated in the "Contact Spray."

* Duke of BEDFORD and PICKERING. Science and Fruit Growing (London, 1919).

† G. TRUFFAUT. XIII Congrès de Chimie Ind., 1933, Bouillie Bordelaise; G. TRUFFAUT et I. PASTAC. B. Bordelaise Jardinage, p. 1 (Juillet 1933).

Before the war only soap, Turkish red oil, and alcohol were used. Now the number of wetters prepared in the dye-stuff factories is very great indeed. Their study requires a very special knowledge and technical skill rather rare in agricultural laboratories. Nicotine is still the principal contact insecticide. Pyrethrum, which had been quite given up, begins to regain importance, while Rotenone, which was a failure with the codling moth, has proved to be a powerful agent against red spider and the Colorado potato beetle.

Formerly the struggle against *Oidium Tuckeri*, *Sphaerotheca*, and other fungi was carried on with sulphur and its derivatives (poly-sulphides, colloidal sulphur, etc.). The efficiency of these agents depended on the weather. If it was cloudy and cold sulphur lost its power, and such mildew as was caused by *Sphaerotheca pannosa* (the mildew of Roses) always resisted the influence of sulphur.

The treatment of trees with special dyes has proved to be a powerful agent against the various kinds of mildew, whatever the atmospheric conditions. The efficiency of such special dyes depends not only on the choice of the dye, but also on the selection of the wetting agent. Such a choice is very difficult. Nearly all wetting agents alter the dyes.

Plant foes, living in the soil, may be killed by various methods. Ploughing is effective for the destruction of the white grub. For this purpose pigs, which feed on all grubs, should be allowed to follow the plough.

Heating the soil is a very widespread method for partial soil-sterilization in greenhouses. This costly method has found a competitor in the chemical treatment.*

Partial chemical soil sterilization was studied by Sir JOHN RUSSELL and by HUTCHINSON at Rothamsted; by BEZSONOFF and myself at Versailles, and by others.†

Partial soil-sterilization decreases the number of bacteria per gram, but after a few days in the soil treated in this manner, the number of bacteria increases very considerably. This phenomenon is observed when all kinds of disinfectants are used (phenol, nitrophenol, carbolineum, chlorinated lime, formol and others).‡

There are various explanations for this phenomenon :

(1) It is possible that all protozoa, micro-organisms, and bacteria may be killed, but that the spore-forming bacteria reappear rapidly, because their spores have not been destroyed. Therefore these bacteria can increase rapidly, as the protozoa, which formerly fed on them, were destroyed.

(2) The second hypothesis of DHERELLE presumes that the partial soil disinfection destroys the ultra-microscopical bacteriophage parasite of the useful bacteria. Perhaps the two phenomena may co-exist, as well as other unknown factors.

* BEWLEY. Practical Soil Sterilization (London, 1922).

† RUSSELL. Soil Conditions and Plant Growth (London 1932); *ibid.*, Chemistry and Land. TRUFFAUT and BEZSONOFF, Science du Sol (1912), etc.

‡ TRUFFAUT. XIV Congrès de Chimie Ind., 1934, No. 151 (Paris, 1935).



FIG 28 THE LAWN AT TRGWITHEN FACING SOUTH

To face p 106



FIG. 29 *VIBURNUM BLUTII* IN FRUIT AT TREWIDEN
CHRISTMAS 1936

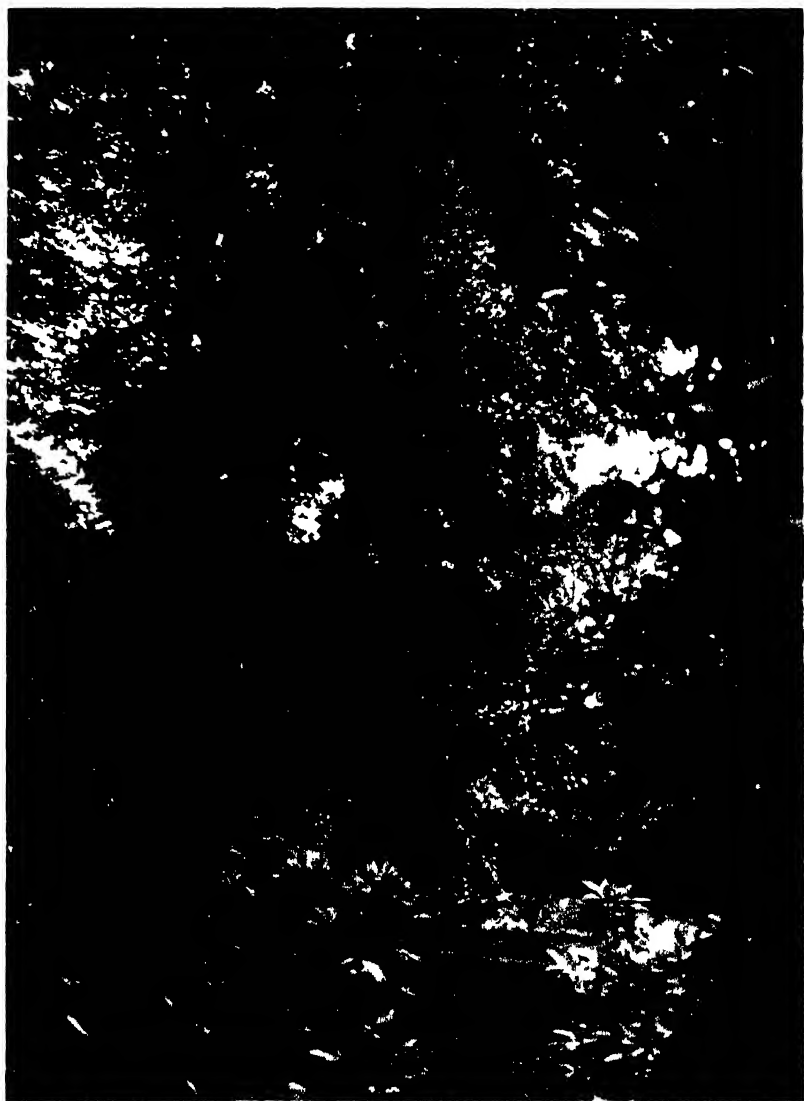


FIG. 30. *EUCRYTHA BILFARDIERI* IN FLOWERS AT TRIWILHIN.



FIG. 31. *ILEX INSIGNIS* AT IRIWITIH.

Indeed during our numerous experiments at Versailles, for which various antiseptics were used (mostly cymene, calcium sulphide, hypochloric acid, carbolineum, and phenolic bodies), the conclusions arrived at were variable. All these compounds, though effective, are dangerous for the growth of the plants. On the other hand, the use of formol gave exceptionally good results. We succeeded in rearing fine vegetables on soils which were badly infected.

Maybe this successful result was due to antitoxine. You know that the addition of formol to toxic matter (diphtheria virus, snake poison) changes it into an anatoxine. The same happens in a compound which allows a struggle against poison ; the body becomes resistant against infection. It seems probable that formol exercises a similar action in the soil, transforming the toxins in the soil bacteria into anatoxines, thus permitting plants to withstand organic poisons.

The partial soil-sterilization problem gave us the idea of using specific dyes for agricultural purposes, especially for the destruction of *Ephibolus graminis*, and *Leptosphaeria herpotrichoides*, which causes a disease of cereal stalks, named in French " Le Pietin."

Spraying soils with organic dyes has brought us to a curious discovery, namely, that some organic dyes are able to destroy in field conditions charlock, without harming the growth of cereals (Oats, Barley, Rye, and Wheat). Charlock is a weed of European origin. It was imported to America and Australia, and is now a most troublesome weed for arable land all over the world. The presence of charlock in cereal crops has sometimes caused the loss of from one- to two-thirds of the crop.

Spraying the fields with a solution of a special yellow dye destroyed the charlock in four days ; whereas the cereals, set free from it, thrived admirably. This discovery that weeds may be destroyed by synthetic dyes is an example of the manner in which unprejudiced investigations may lead up to new and unexpected results.*

I am highly gratified to have the privilege of speaking in London about this new utilization of dyes, because it was chiefly in this city, in the laboratories of the Royal College of Science, that AUGUST WILHELM VON HOFFMANN elaborated the principles of the chemistry of dyes.†

I do not intend to create the impression that all research work must be directed towards practical application. The progress of our civilization depends to a great extent on research work and on observations of a purely scientific character. There is the basis for future discoveries.

The problems of electrical influence on vegetables have been studied for years in this country. Electrical heating of the soil, as well as electric light, is now used in many English nurseries.

* G. TRUFFAUT and I. PASTAC. L'action sélective des matières colorants, XIV Congrès de Chemie Ind. 1931, No. 189 (Paris, 1935).

† CARO, Ber. d. Chem. Ges.

At Versailles I have succeeded in achieving the complete development of such plants as Wheat, Oats, Roses, Strawberries, and others, which had never received any but electric light. I have published in the Journal of the French National Society of Electricians all the details and data concerning the most favourable wave-lengths of rays, the optimum voltages, and the intensity of electric light.*

Our long studies concerning natural electrical phenomena have led to the important discovery that the foliage of plants is always negatively charged. This phenomenon explains the adhesive or non-adhesive nature of certain chemicals, such as arseniates, on the leaves. This was useful for the spraying processes. Practical measurements and cultural results proved that any continuous currents, even of the smallest intensity, introduced into a plant were always noxious and generally entailed the death of the trees treated in this manner.

At present I am experimenting in my fields at Rocquencourt, near Versailles, on the effects of atmospheric electricity and of terrestrial magnetism on vegetables. Maize has been chosen for these experiments. Faraday cages and various fittings, even dielectric dispositions, have been devised. We have already achieved some promising results.

I consider soil microbiology one of the most interesting branches of my laboratory work. Since 1919 I and my collaborators, MM. BEZSONOFF, VLADYKOFF, and LEFOUIN, have toiled on the problem of the nitrogen cycle.†

In 1924-25-26 we studied the utilization of atmospheric nitrogen by non-leguminous plants. We proved before the French Academy of Science that non-leguminous plants, in conjunction with specific nitrogen-fixing bacteria, are able to utilize free nitrogen from the air. These bacteria are non-symbiotic.‡

Formerly soil bacteria were supposed to derive their energy exclusively from organic compounds decaying in the soil. We have established in my laboratory at Versailles that the majority of soil bacteria may live by utilizing as a source of their energy exclusively carbohydrates and the organic salts excreted by the root-hairs of the plants.

This is a very important fact. It explains how vegetation may thrive in sterile soils, or in soils recently dug over, as well as on recently formed volcano cones, totally devoid of organic matter. Living green plants are thus the main source of energy for soil micro-organisms.

Photosynthesis controls the number of the soil bacteria.§ The

* G. TRUFFAUT. "Croissance des végétaux en lumière artificielle." Bull. Soc. des Electriciens, 9, p. 910 (1929).

† G. TRUFFAUT and BEZSONOFF. Science du sol (1922), and TRUFFAUT and VLADYKOFF, C. R. Acad. de Science.

‡ Science du Sol, vol. 3; C. R. Acad. de Science, 183, p. 1065 (1926).

§ G. TRUFFAUT and LEFOUIN. Influence des récoltes sur la micropopulation du sol, XIV Congrès de Chimie, Paris, 1934, No. 151 (Paris, 1935).

same phenomena exists in the sea, where the energy required by the bacteria is produced by green algae and diatoms.

In the soil the majority of bacteria live thus in close association with the root-hairs of the plants. They are non-symbiotic. They multiply more or less according to the quantity of the organic excreta exuded by the root-hairs following the action of the sun on the leaves of the plants.

Some of these bacteria fix the free nitrogen contained in the air in their bodies. All of them accumulate phosphorus, potassium, magnesium, iron, manganese, and even calcium in their tissues. As a rule bacteria live no longer than 3 hours. Multiplication as well as decay goes on according to the food supply. Thus an organo-mineral, very complex plant food is constantly prepared ; and after chemical simplification may be utilized by the root-hairs of the plants, acting in competition with the soil algae, fungi, and bacteria.

In co-operation with VLADYKOFF, I have ascertained that generally the same species of plant feeds a special bacterial flora, which seems to persist whatever the climate may be.*

Before concluding this lecture I wish to thank you all for the attention with which you have listened to it. I hope that many of you will come over to Paris in 1937 for the International Exhibition. I shall be very glad to receive you at Versailles and to show you over my laboratories and experimental farm. There you will see the practical application of the theories I have just had the honour of trying to explain.

* G. TRUFFAUT and V. VLADYKOFF, *loc. cit.*

MASTERS LECTURES, 1936.

THE POTATO IN ITS EARLY HOME AND ITS INTRODUCTION INTO EUROPE (*cont. from p. 77*).

By REDCLIFFE N. SALAMAN, M.D., F.R.S.

WE have referred to the great antiquity of potato cultivation in South America ; it is now necessary to examine the evidence for this statement. The evidence that will be adduced both for the antiquity of the potato as a cultivated plant in South America and the part it played in the life of the people is largely based on archæological data, and especially on the pottery which has been excavated in such profusion during the last forty years. The subject of dating and the sequence of culture is a difficult one and quite outside the writer's competence. It is therefore with especial pleasure that he acknowledges his indebtedness to the distinguished expert, Mr. T. A. JOYCE, for permission to reproduce considerable extracts from his valuable résumé of the subject,* as well as for his advice and criticism in regard to the archæological and anthropological aspects of the problem.

JOYCE writes : " The complete absence of any form of writing deprives the student of any indications of date such as are provided by the dates on the Early Maya monuments. Traditional history is practically confined to the rise and growth of the Inca empire. . . .

" The history of South American art is the history of the interaction of two opposing forms of culture, based on two very different environments. On the one hand stands the culture which developed amidst the highland plateaus and valleys of the Andes, well-watered and rich in stone. On the other, the culture of the rainless coastal districts, where stone was not available for building purposes, and agriculture on any considerable scale was only possible at the expense of bringing water for many miles from the mountain slopes by means of aqueducts. Pastoral and agricultural life was characteristic of the highlands, but the coast looked to the sea as its natural provider.

" The contradistinction between the highlands and the coast is manifest in the first phases of artistic development in South America. In the earliest period three contemporary culture-regions may be distinguished, the first covering the northern half of the Peruvian littoral, with its centre at Truxillo, the second covering the southern half, with its centre at Nasca, and the third on the high plateau of Bolivia, with its centre at Tiahuanaco, near La Paz. To the first has been given the name *Proto-Chimu* (from the name of the paramount chief who was ruling in that area at the time of the Inca invasion at

* T. A. JOYCE. Introduction, Catalogue of an Exhibition of Objects of Indigenous American Art, Burlington Fine Arts Club, London (1920).

the end of the fourteenth century) ; to the second, the name *Proto-Nasca* ; while the third is known as *Tiahuanaco I*.

" Very little is known of the Tiahuanaco I period, which is distinguished by megalithic masonry and rude but forcible stone carving, but about the end of the second century A.D. it blossomed into the remarkable period known as Tiahuanaco II, which is described below.

" The Proto-Chimu and Proto-Nasca cultures were evidently related ; they are distinguished by pyramids and other buildings constructed of large balls of clay placed in position while wet, and allowed to dry, by very remarkable pottery, and by a highly developed textile art. It is the pottery which constitutes the most important class of remains. To speak roughly, Proto-Chimu art developed in the direction of form, Proto-Nasca art in the direction of colour. The Proto-Chimu pots which are modelled in human and animal forms are distinguished by a remarkable realism ; . . . only two slip colours were used, red and cream. In Proto-Nasca pottery, moulded work is rare, and, when it occurs, is stiff and conventional. The painted designs, though less free than those of the Proto-Chimu, are distinguished by a variety and depth of colour which is unique in the history of primitive pottery. The colours gain additional effect from the heavy black outlines within which they are almost invariably enclosed.

" Which was the earliest of these three artistic centres it is impossible to say, but it is obvious that the two coastal cultures had been in existence several centuries before their supersession about the beginning of the third century A.D.

" The cause which put an end to this brilliant period of Peruvian art was the rise and spread of the culture known as *Tiahuanaco II*. This, as has already been said, was the direct offspring of Tiahuanaco I, but it would appear that certain Proto-Nasca influences, spreading inland, helped to give impetus to the wonderful artistic development which characterizes this period ; . . . both in megalithic and polygonal masonry, in stone-carving, in goldwork, pottery and weaving, the artist of the time produced work of the highest order ; in modelling alone did he fall short of the Proto-Chimu.

" The Tiahuanaco II culture, starting from the same centre as its predecessor, gradually spread throughout the upland region of Peru, and, descending to the coast, superseded the Proto-Chimu and Proto-Nasca cultures. Further, it sent a branch southward into what is now North-western Argentina. . . .

" Obviously the commencement of this period in the uplands must have antedated its appearance on the coast, but the question of dating is so uncertain that in the comparative chart on p. 115 the two are, for convenience, shown as simultaneous. Equally obviously, the manifestation of this art upon the coast was but a modification of the type ; for instance, it is confined almost entirely to pottery and textiles, since practically no stone suitable for sculpture was within reach of the coast dwellers.

" The subsequent history of the Tiahuanaco II period is everywhere one of degeneration. The course of history suggested by the archaeology is as follows. First, the rise of a big empire throughout the highlands and extending to the coast, following the same lines as the Inca empire which succeeded it centuries later. Then a collapse, and a reversion to independence on the part of the subject tribes. At any rate, Tiahuanaco II style gradually passes by degrees through several phases of degeneration (the earliest sometimes called "Epigonal") until on the northern coast it is represented in the penultimate stage by pottery painted in red, white and black, and finally with simple black and white, or brown and white decoration. . . .

" The final extinction of the last phases of the Tiahuanaco II period, both in the highlands and on the coast, may be reckoned to have occurred about the end of the eighth century A.D.

" About this time a very interesting development took place on the coast, amounting more or less to a revival of the Proto-Chimu and Proto-Nasca arts, with the same two centres, the Truxillo region in the north, and the Nasca Valley in the south. These two cultures are known respectively as Chimu and Nasca.

" Like the Proto-Chimu ware, the pottery of the Chimu period is characterized by modelling in naturalistic style, but the ware typical of the revived art is black or dark grey: and, though the vases are superior in technique to those of the earlier period, they are far inferior in artistic qualities. The textile arts, however, flourished, and the working of gold and silver attained great technical perfection. . . .

" These two periods, the Chimu and the Nasca, lasted in their purity until the close of the fourteenth century A.D., when the coast was conquered by the Inca, and many new elements were introduced.

" To return to the highlands. It has been said that the last degenerate phases of the Tiahuanaco II period may be considered to have disappeared by the end of the eighth century A.D. This seems to have been followed by about three centuries of almost complete stagnation. But the commencement of the twelfth century ushered in what was destined to be one of the most remarkable political developments which the world has ever seen, the rise and expansion of the Inca. This people, who derived their origin traditionally from the south, settled in the Cuzco Valley, where for three centuries they contented themselves with making their footing secure and winning an ascendancy over the tribes immediately to the south and west.

" At the end of the fourteenth century, which marks the close of the *Early Inca* and the commencement of the *Late Inca* periods (the division is political rather than cultural or artistic), the Inca state underwent a remarkable development. A great victory over an important tribe called Chanca, lying to the north and north-west, was followed by the conquest of the upland country as far north as, but excluding, Caxamarca, and of the coast from Arica to Truxillo. Subsequent years brought further expansion, until the Inca dominion, at the time of the Spanish conquest, extended over the whole country

west of the great forests, from the river Ancasmayu in Ecuador to the river Maule in Chile, and embracing the modern states of Ecuador, Peru, Bolivia, and part of Chile and North-west Argentina. . . .

"Their buildings, almost entirely without ornament, but relying for effect upon their mass and the perfect fitting of the blocks of which they were composed, were the most advanced, to speak architecturally, in America. Their pottery, subdued in colour, and severe in decoration, shows great perfection of technique, and considerable beauty of form. One particular pattern of vase is especially associated with their civilization, and is found wherever their influence spread.

"Although, in the Late Inca period, many of the local arts practised by the subject peoples, such as the Chimu and Nasca, persisted, yet the tendency of the Inca system was to produce a great homogeneity, and the practice of transporting whole sections of the population from one part of the empire to another, in order to minimize the danger of revolt and to bring waste lands under cultivation, was highly conducive to this result."

SCHEME OF DATING OF THE PRINCIPAL PHASES OF INDIGENOUS AMERICAN ART.

(From T. A. Joyce, *loc. cit.*)

(Note.—No dates can as yet be suggested for the commencement of the earliest periods.)

Approximate date.	Peru and Bolivia (Highlands).	Peru (Northern Coast).	Peru (Southern Coast).	Ecuador.
A.D. 200	Tiahuanaco I.	Proto-Chimu.	Proto-Nasca.	
A.D. 300		Tuanacho II, and derived styles ("Epigonal," etc.), degenerating.		
A.D. 800	Tiahuanaco II.			
	Period of degeneration.	Chimu.	Nasca.	Pre-Inca probably related to Proto-Chimu.
A.D. 1100				
A.D. 1400	Early Inca.			
	Late Inca.	Late Inca superimposed.		
A.D. 1519-33		Spanish Conquest.		

The first representations of the potato occur in the Proto-Chimu period and in the second horizon of the Muchik pottery (TELLO), which permits us to speak of the potato as a cultivated plant at least as early as the second century of the present era. The representations, however, are of a symbolic character, which implies that the potato had been a familiar article in the lives of the coastal people for many generations,

if not centuries, before this time. How long a period elapsed between the first attempt to cultivate the wild potato in the mountains and its acceptance and employment there as a staple article of diet we do not know. It must, however, have been considerably later before it became not only an article of commerce but actually a cult object on the coast. This latter stage of its evolution we can date as being somewhere about the beginning of the Christian era. The prior phase must presumably have occurred several centuries, if not millenia, before that. It is unlikely that we shall ever obtain data that will allow of even an approximate date being fixed for man's first appearance on the altiplano of Peru and Bolivia, but we are justified in assuming that whenever this did take place it was his timely discovery of the potato that allowed him to maintain himself there.

It is no exaggeration to say that the ceramic art of the northern coastlands of Peru from Trujillo to Nasca, *i.e.* roughly from latitude 8° S. to latitude 16° S., is amongst the finest in the world ; for variety of design and realism in its execution the Chimu pots are unequalled. Quite different are the harmonious polychrome decorations of the Nasca ceramics which are rendered so outstanding by their peculiar stylistic beauty, their simplicity of shape, and the delicacy of their ware.

But what of the designs on these Nasca pots ? They represent fearsome cat-gods, the terrifying centipede-gods, complex nightmare combinations of man and jaguar, condor and serpent. Imagination seems to have run riot in an atmosphere of fear, and death and unappeasable phantoms hound man on to his ineluctable fate. The stylistic treatment is evidence of the length and continuity in time of this strange sadistically cruel conception which makes of life a veritable hell on earth.

The Chimu and Muchik styles differ profoundly from those of Nasca. Here we find marvellous sculptured portraits never, one imagines, flattering, but depicting men with a quiet sombre dignity from whose faces, however young, youth's illusions have long since fled. Very common are caricatures and grotesques of maimed beggars, of which we shall have more to say. Pots representing heads of men with double hare-lips, the faces elaborately ornamented with concentrically designed cicatrices or tattooing, are also common in the early and late Chimu periods.

But in many of the designs the head of the jaguar or puma, with his mouth open and his canines bared, plays some symbolic part ; occasionally symbolism is dropped, and the tiger is seen devouring his victim, who may be bound and helpless, waiting for his end ; in others we see masked men, or creatures with human heads and enormous threatening teeth, holding other heads in their hands ; in some, a priest or other, with a short stone knife in hand, deliberately decapitating some kneeling wretch. In most there is displayed a macabre fascination for death. Still, not all is sombre and cruel in the long and vivid record of sculptured and painted pots which the early



FIG 33 - EARLY CH MU
Anthropoid pot with deeply incised " eyes "

[To face p 116

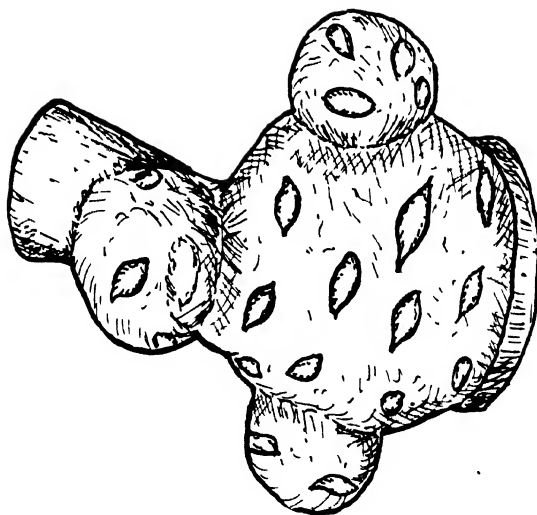


FIG 32 - LATL CHMU SUGGESTING A
CONVENTIONALIZED HUMAN FORM



FIG. 34—EARLY CHIMÚ PERIOD (FROM VALLEY VIVA)
Anthropoid pot with potato eyes on body and
ears.



FIG. 35 EARLY CHIMÚ CREAM RED
Anthropoid pot with two human and two Simian figures



FIG. 36. PROTO-CHINESE PERIOD. KLDDISH, BROWN AND CREAM

Front and back view. Head in front shows mutilated mouth and nose at back coarse features and large mouth



FIG 37—GREVILLEA X SEMPERFLORENS

To face p. 117.

Peruvians have left us: thus, we meet with curiously outspoken scenes of sexual life which usually go unrecorded, and others of perversions both with man and beast. A notable feature of this type of scene is that it is frequently represented as taking place in the presence of apparently uninterested witnesses. The underlying psychology seems closely akin to that already deduced from the pottery described. However, our business is not with man's failings, but with his foodstuffs, and in this connexion we must turn to that class of pot which depicts for us *genre* scenes of home and farm, of the Indian's llama and his dog, and, above all, of the numerous plants he cultivated. Of these we find countless representations: the squashes, the beans, the manioc, amongst plants; the spondylus shells, the llama, and the monkey are all familiar designs, but more frequent than any are representations of maize and potato amongst plants, the jaguar and puma amongst the animals. The latter may enter the designs in many ways, and though they frequently seem suggestive of terror, their association with the potato has probably a different symbolic meaning.

The Yucca and the maize plants may occasionally be represented on the early pots in close association with a human face; the latter, adorned with attributes of dignity in the headdress, probably represents the spirit of the plant, but these particular anthropomorphic pots are relatively rare and, as far as the writer's knowledge goes, are not associated with the representation of physical deformity or mutilation. This latter fact makes, as we shall see, a definite distinction between the symbolic treatment accorded to the potato as compared with the other vegetable crops in use.

The potato is a frequent motive in the designs adopted by the Chimú and Muchik potters, some of which present problems we must now attempt to solve. We may divide all those pots which in one way or another portray the potato into three groups:

(1) Pots in which there is no association with human figures but in which the potato is depicted in a more or less realistic manner, as well as those pots in which the potato element is conventionalized or even reduced to a mere symbolic "eye."

(2) Pots in which the potato is represented either as a human being or in some close relation to a human being: this group may be further subdivided into:

(a) Pots in which the human face is normal.

(b) Pots in which the human face is mutilated.

(3) Pots which present a design which is transitional between groups (1) and (2).

The first group of potato pots, of which the writer has some thirty photographs, all belong to TELLO's second and third epochs, *i.e.* the Late Chimú, the pre-Inca, and the Inca periods, *viz.* to a period stretching from about A.D. 800 to A.D. 1550.

It is easy to arrange these pots in a series so that those at one end are more or less vividly realistic representations of the tubers, whilst

those at the opposite are merely pots in which the potato as a motive is progressively reduced to a symbol, such as a few irregular swellings of the contour, with a suggestion of an "eye," or with nothing to indicate the tuber itself but only a few conventionalized "eyes" introduced as part of a more or less formal design. Between these two extremes one can construct a regularly graded series. The pots in which conventionalization of the potato has proceeded farthest are of the Inca period, whilst the more realistically designed are of the Late Chimu period; figs. 3-8 illustrate the salient features of the series. Amongst the pots of the Early Chimu period the writer has found but one which may be classed in this group.

This pot (fig. 3) represents twin tubers, and these, as we shall see, have a special significance which probably does not apply to the twin pots represented in figs. 5 and 7. We know from the native folklore of to-day that monstrous twin tubers are regarded as being endowed with special reproductive gifts; the Spanish chroniclers, too, speak of the magic value of twin maize cobs. The schematic representation of the eyes, the absence of buds within them, and their dark colour as contrasted with the very pale body of the tuber, however, strongly suggest that the pot represents potatoes which have been converted into chuño of the 'tunta' type. A comparison with fig. 2 in which both the common chuño and the tunta type are represented supports such a view. As this pot belongs to the Early Chimu period, it affords valuable evidence of very early commerce in this manufactured product with the highlands.

Twin pots such as those in figs. 5 and 7 are a common feature of the later pre-Inca and Inca period, but their design is more likely to be related to the whistle inside one of the spouts which comes into play as the water is poured out of its fellow, than to a symbol of fertility.

In fig. 4 the body of the pot symbolizes the tuber, and in the treatment of the eyes considerable realism is observed.

In fig. 6, a pot of the Inca period, the same theme as that in fig. 4 is treated in a more consistently conventional manner.

In fig. 8, another Inca pot, the potato motive is reduced to a few rather realistic "eyes."

Between the first and the second group in which the human form takes some part we find pots (group 3) in which, whilst the representation of the potato is fairly realistic and related to the monstrous twin tuber type, they are so designed that the component tubers give rise to a figure suggestive of some animal or human form of a conventionalized type; examples of these are shown in figs. 9, 10, and 32.

Figs. 9 and 10 represent a type of which the writer has two identical examples; the face of some creature is obviously intended, as is shown by the treatment of one of the potato "eyes" on the face, which is converted into a real eye as distinct from the schematic potato "eyes" which form the general decorative scheme of the pot. The ears of the creature are also constructed out of a pair of potato "eyes"

placed side by side, and marked off from the rest of the decoration by an enclosing line.

In fig. 32 we have a pot in which one large tuber has three secondary tubers attached to it in such a manner that one serves as a head and the other two as arms, the whole being a degenerate type of the anthropomorphic pots we must consider next.

The three pots of this intermediate series belong to a period which is not only pre-Inca, but one which is antecedent to the Chimú. Whether they belong to the Proto-Chimú or, as the writer suspects, to a later epigonal period is uncertain.

Group 2 (a).—The writer has only seven examples of this group of pots in which potato and man are brought together without evidence of induced deformity in the latter. In two of them the man's head is constructed out of a secondary tuber growing from the main one which represents his body, and which is decorated with very outspoken "eyes"; such a pot is represented in fig. 11. In a third we have one main figure and two subsidiary ones, made out of secondary tubers, the whole being decorated with "eyes."

The fourth pot (fig. 33) depicts a man in the squatting position, his whole body being decorated with potato "eyes." And here the artist has played one of those curious tricks occasionally to be found in Chimú pottery: the "eyes," which are cut on cheek and forehead, are so placed that if the pot be turned upside down the upper part of the face and the forehead become a new head looking normally downwards.

In another example the man's head rises from the top of a more or less spherical pot on which a few "eyes" are lightly etched, and from which several small secondary tubers project (fig. 34). Here may be included those pots in which a monkey takes the place of a man. An example is to be found in the Göteborg Museum (No. 12-17-11) which is similar in type to that depicted in fig. 34.

Finally, there is a pot of the Early Chimú type in the British Museum (fig. 35), in which there are four heads sprouting out of the main more or less cylindrical body of the jar. The central one, the biggest, is a normal male head with simple headdress, and a potato "eye" on the crown; two lateral ones are simian, and a fourth, a female head, springs out of the body of the jar below the central head; on the crown of her head is a potato "eye," and others are painted round the lower part of the jar near the base; the bodies of the apes are shown in outline on the body of the vase and the hands of both apes and men have only three fingers and a thumb. There is nothing to suggest that the missing little finger has been amputated. The arrangement of the figures on the pot strongly suggests a sexual relationship. So far, this is the only pot in which such has been observed in connexion with the potato, whose fertility was invoked, as we shall see, by an entirely different process.

Group 2 (b).—The group comprising these pots, in which the potato is associated with a man showing mutilation of the face, is characterized

by the diversity of the design and the early period to which most of the pots belong. Of the twenty-one examples of which the writer has photographs, four presented by Dr. TELLO are definitely assigned to the Muchik II horizon, and dated second to third century A.D. Most of the others are definitely of the Proto-Chimu period and their dates range somewhere between A.D. 200 and 800. None belongs to the Inca period.

A rough division of the pots may be made into :

- (a) Those in which there are several human heads or whole bodies.
- (b) Those in which there is a single more or less entire human form.
- (c) Those in which the pot is composed of a single head with potato elements impressed on it.

This sub-division is doubtless artificial, but it is a fact of some interest that those pots which fall into division (a) contain all the really Early Muchik and Chimu pots, and those of division (c) almost certainly belong to a considerably later period.

Division (a).—Here the human form is represented as a body built up from a large tuber with the head composed of a secondary tuber projecting from the main one. The pot may be of very irregular shape, with several projecting potato tubers each forming a human head (fig. 36); or, again, the pot may be of a sub-spherical shape with projecting heads in a low relief, with here and there a potato "eye," and amongst these heads may occur that of a jaguar with exposed teeth. Finally, we have two examples in which several individuals are represented; in one, figured by TELLO,* of such, one figure is unmutilated, the rest are shown as mutilated heads, unmutilated corpses, and semi-skeletonized skulls. In the other a priest is conveying an unmutilated corpse together with some strange monster, while the body of the vase is covered with deeply incised potato eyes.

Division (b).—Here we have pots in which the human figure is more or less complete, and in which the potato is represented by an occasional adventitious bud and several deeply incised "eyes" scattered over the body.

In both Divisions (a) and (b) there is a tendency for the design to become conventionalized, a type of which the writer has five examples showing different stages in a progressive deterioration of execution. One is not, however, justified in regarding these as necessarily later in date than those in which the design is more realistic.

Division (c).—Here the jar represents a human head and the potato may only be indicated by ornamentation with highly schematic "eyes." In one jar of TELLO's (Muchik II horizon period, second

* TELLO, J. Prehistoric Peru. Pt. V. xxii (1922).

to third century A.D.) there projects from the shockingly mutilated head great wen-like tubers.

The sex of the mutilated figures represented on the potato pots is a matter of much interest but one difficult to determine. Of the sixteen reproductions in the writer's collection there seems no reason why all but one should not be regarded as females, though there is nothing strikingly feminine about them. The exception is one in which the plumed headgear and great earrings proclaim it male; the whole figure is represented, but the mutilation in his case is confined to the upper lip.

The potato pots of the various sub-divisions of Group 2 (b) we have been describing have one character in common. The end of the nose and the upper or, in some cases, both upper and lower lips, have been cut away, so that the mutilated individual is made to appear like one who had been born with a double hare-lip.

The most exaggerated form of this mutilation was met with in a pot of black Chimu ware, where the nose has been split and the two sides rolled back on to the cheek. In the wars of Chile we read of natives being so treated and the sides maintained in position by the insertion of thorns through the flesh.

Occasionally in pots which would appear to be somewhat later examples of the Proto-Chimu period, the mutilation itself has become conventionalized. The nose is more or less normal but the mouth is very large and so sharply outlined by a pigmented line as to suggest an artificially incised contour.

When we regard these pots in their chronological order it becomes at once evident that the earlier the pot the more realistic is its representation of the potato and the more outspoken is the evidence it affords of a sacrificial ritual in relation to the cultivation of this plant. As time went on, and probably long before the Inca Empire became consolidated, these characteristics became more and more conventionalized.

Attention was first drawn to this mutilation of the face in 1922 by Professor TELLO, when he lectured in Cambridge, and for which he could then offer no explanation. The writer suggested an explanation at that time which, after fourteen years, he still thinks affords a reasonable if partial explanation of a complex problem, which may be stated thus:

(a) Why was the potato so frequently represented in the burial pots throughout the whole range of pre-Columbian history?

(b) Why was the potato so often represented in close association with man?

(c) Why was the man so often depicted as mutilated, and in such a way as to suggest an artificial double hare-lip?

(d) Why should the open-mouthed jaguar be also associated with the potato in many of these pots?

Question (a).—The answer is to be found in the overwhelming importance to certain sections of the population of the potato as a food,

and the facility with which from earliest times it had been converted into a conserved food—chuño—valuable at all times, but especially so in times of famine and of war, to the people both of the coast and the Sierra.

Question (b).—It is suggested that the human form depicted on these pots represents the spirit of the potato and that its more frequent association with the potato rather than with the other great food sources such as maize, is to be found in the answers given to Questions (c) and (d).

Question (c).—There exist in Peru and Bolivia to-day a great number of varieties of the potato, many of which have blood-red or deep purple coloured skins, and in not a few the flesh itself is similarly coloured; the suggestion of flesh and blood is obvious. Nearly all the native varieties have deeply incised "eyes," and around the "eye" in many is a bolster-like swelling which makes the "eye" appear both deeper and bigger; from the bottom of these "eyes" spring the buds which will give rise to the new plants in the following season. Finally, most native varieties are round, and not cylindrical or kidney-shaped as are our own.

If now by a simple change of metaphor we assume that the Indian regarded what we call an "eye" as a "mouth," then we see that all the common features of the tuber can be likened to those of a human being. The round tuber is the head, an elongated one the body, irregular outgrowths are limbs, the "eye" becomes a mouth with well-defined lips, the buds are teeth serrated like those of a tiger.

We have seen how intelligent an agriculturist the South American Indian was; he must at a very early date have learnt that the value of a seed tuber was to be measured by the vigour of its buds, *i.e.* by the size and strength of its teeth; the bigger, the more prominent the teeth, the greater the promise of the crop to come.

The next step would seem to follow logically. The potato, like everything living or non-living, was animated by a spirit, a god. The native of the altiplano, who knew only too well that the potato crop frequently failed, would naturally ascribe the failure to the incapacity or weakness of the potato spirit. It was essential, therefore, for the preservation of his very existence that the potato spirit's energy should be maintained at a high level. To reinforce that spirit he made sacrifice and, if necessary, an important sacrifice, a human sacrifice, the shedding and absorption of whose blood was alone capable of imparting the necessary vigour. But mere sacrifice was not enough; there was too much at stake; it was necessary to show the god exactly what was wanted in order to ensure a good crop. The prime pre-requisite, as he well knew, was seed tubers with big mouths and prominent teeth. Hence by the means of a sacrificial mutilation, the cutting off of the end of the nose and the removal of the lips, the mouth was enlarged, the teeth made prominent, the god both strengthened and instructed, the people eventually saved.

Question (d).—The jaguar head with his open mouth and great serrated teeth may have served to reinforce the suggestion of a "good mouth" already induced by the artificial hare-lip. There is the further reason that as the jaguar was identified with the creator god Viracocha, its participation in the ceremonial rite was but logical.

If one is right in considering the figures represented as female ones the argument is further strengthened. We shall see that both maize and potato were invoked in field and store in the form of specially decked corn cobs and potato tubers, and that these were adorned as women and addressed as Zara-mama or Axo-mama—the generative mother or spirit of the maize and potato respectively.

It was probably regarded as a further advantage that the rite should have converted the sacrificial victim into a living hare-lipped individual. For the possessors of congenital hare-lips were always sacrosanct and endowed with peculiar powers, particularly in relation to frosts. Their frequent appearance on pots suggests the possibility of an association of ideas between the success of the potato crop and the control of frosts.

If the explanation which has been offered is the correct one, it might be expected that some memory, however faint and distorted, of such rites might have been recorded by the early Spanish writers, or even observed to-day. We must not, however, expect to find any very clear evidence of human sacrifice, for we have seen that this type of sacrifice in relation to the potato as recorded on the huaca pots did not occur during the Inca period, which means that it had not been current practice for a century or more before the Spanish chroniclers appeared on the scene. Human sacrifice, however, had not entirely disappeared in the Inca empire, even at its close.

The evidence for the existence of customs indicative of sacrificial rites in connexion with the potato persisting at the time of and subsequent to the Conquest is set forth in chronological order in what follows.

(To be continued.)

GREVILLEA × SEMPERFLORENS.

By B. O. MULLIGAN, N.D.H.

UNDER this name two plants were exhibited at the R.H.S. Show in London on March 24, 1936, and were stated to be the result of a cross made in 1926 or 1927 between what was thought to be *Grevillea Preissii* and *G. sulphurea*, the former being the seed parent. This cross was made by the exhibitor, Miss F. E. BRIGGS, of "Fursdon," Crown Hill, Plymouth, and the plants, thanks to the generosity of Miss BRIGGS, were subsequently taken to Wisley to be grown there. The name *G. Preissii* is a later name for *G. Thelemanniana* and *G. sulphurea* is properly called *G. juniperina* var. *sulphurea*.

In habit this plant is graceful and most attractive (fig. 37): the branches droop loosely outwards from the centre, and are not stiffly extended like those of *G. juniperina sulphurea*, whilst the often pinnate leaves give the bush a light and airy appearance. This is increased by the pendent bunches of flowers swinging easily on short stalks from the branches, whose unusual colouring immediately draws attention. The buds are rosy-tinted, due to the curled styles held by the buff or apricot perianth, and on the release of the former the contrast between the two parts is more distinct, since the styles are rose-pink.

Miss BRIGGS considers the plant to be only half-hardy in the south of England, but writing to the Director of Wisley in March 1936 stated that it had then stood three winters outside against a south wall, with the protection of butter muslin in severe weather, and was more than five feet in height and width. "Given some slight protection during cold spells it will flower profusely during November and continue in flower during the winter." For this reason she coined the name "semperflorens." One of the two plants sent to Wisley has been placed outside against the brick wall of one of the propagating pits facing south, and until early January it has stood unharmed. It remains to be seen how it will stand the much more severe winter and early spring conditions which the Gardens experience as compared with south Devon.

G. juniperina var. *sulphurea* has been growing a few yards away against the end of the peach wall for many years, suffering in no way from any sort of weather. It is notable for a flowering season which begins about the latter half of April and extends until July or even later, as well as for its attraction for bees, and with the distinctive ever-green foliage and conspicuous yellow flowers of curious construction may, in the south at least, be counted a very valuable garden shrub.

As a matter of botanical interest and as a possible check on the presumed parentage, hand sections were cut across the leaves of the hybrid and of each of the two presumptive parents. The material

chosen was as uniform as possible, being taken from the base of the one-year-old flowering shoots, each leaf sectioned at about mid-length, and drawn directly from the object without using a camera-lucida. For the leaves of *G. Thelemanniana* I am indebted to Mr. R. DAY of Trebah Gardens, Cornwall; those of *G. juniperina sulphurea* came from the Wisley specimen. Fig. 38 shows the appearance of typical cross-sections of each under the low power of a microscope ($\times 125$), but is, of course, somewhat diagrammatic. Whereas the leaf of *G. Thelemanniana* has on the under side a thick raised ridge almost as wide as the blade, and the groove between blade and ridge is filled with fine

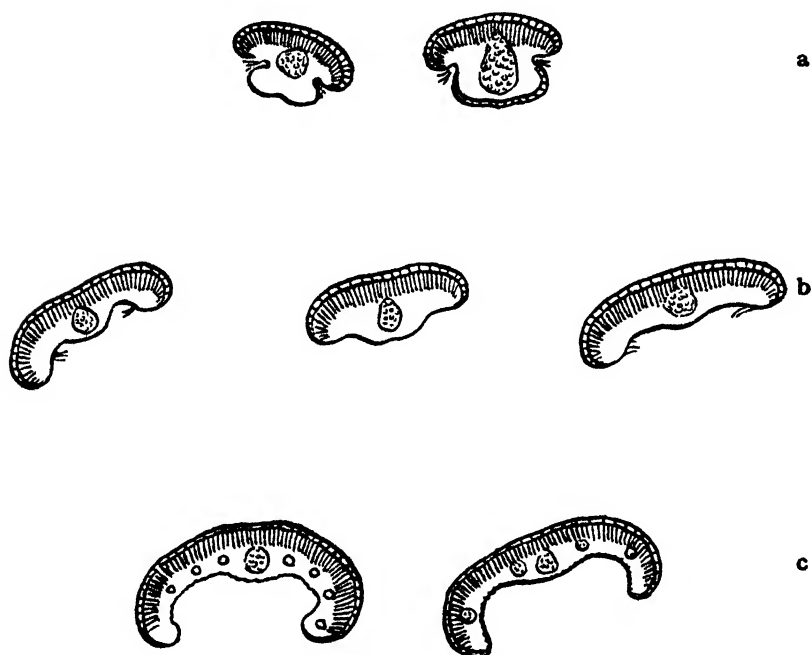


FIG. 38.—CROSS SECTIONS OF LEAVES OF (a) *G. Thelemanniana*, (b) *G. x semperflorens*, (c) *G. juniperina sulphurea*.

silky hairs, in *G. juniperina sulphurea* the leaf is rolled into almost semicircular form, there is no prominent ridge, and the under side carries only a few hairs. In the hybrid the structure is variable, there being sometimes a definite ridge, at other times a tendency to curve, while the shallow grooves beneath are densely hairy, although in the section this is not clearly seen. The differing shape and arrangement of the vascular bundles are also noteworthy.

Comparison with *G. rosmarinifolia*, the other species more or less hardy in this country with flowers of similar colour to those of *G. Thelemanniana*, and with which it has frequently been confused, shows several points in leaf structure that are not represented in the hybrid. There seems therefore little doubt that the presumed parentage is correct.

In passing it may be mentioned that there is already a natural hybrid known within the genus, which was originally described by ROBERT BROWN from New South Wales as a species, *G. Gaudichaudii*, but recently shown* to be a hybrid between *G. laurifolia* Sieber and *G. acanthifolia* A. Cunn.

Of the two species concerned in *G. × semperflorens*, *G. Thelemanniana* is a native of Southern and Western Australia, while *G. juniperina sulphurea* is found only in New South Wales, so that they could not cross in the wild state. The former parent was first flowered at Kew in 1870, and is figured in the Botanical Magazine of that year at t. 5837 as *G. Preissii*, and in the Gardeners' Chronicle, 3rd ser. lxxv. 7 (1919). *G. juniperina sulphurea* is illustrated in Loddiges' Botanical Cabinet at t. 1723 (1831), in the Botanical Register, t. 1089 (1827), and elsewhere.

A detailed description of this new hybrid follows :

Grevillea × semperflorens F. E. Briggs ex Mulligan : hybr. nova. (Proteaceae).

Hybrida hortensia artificia inter *G. Thelemannianam* et *G. juniperinam* var. *sulphuream* ; proprietates media.

A loose-growing shrub, to 6 or more feet high, the young shoots densely pubescent with appressed hairs. *Leaves* formed either of one linear mucronate segment, often forked or divided towards its apex, or of one or two almost opposite pairs of forward-pointing segments, the lower longer than the upper, the segments 1.5–3.5 cm. long by just over 1 mm. wide, the whole leaf 3–4.5 cm. long by 1–1.5 cm. wide ; margins slightly recurved and midrib raised beneath, the groove between midrib and margin thickly lined with silky white hairs. *Racemes* many-flowered, chiefly one-sided, about 1–3 cm. long, frequently hanging from a short peduncle 1–2 cm. long, either axillary on the longer branches or terminal on short spurs. *Pedicels* 4–5 mm. long, pubescent, as is also the 0.7–3 cm. long *rhachis* ; *flowers* solitary or in pairs. *Perianth* thinly silky pubescent outside, villous inside around the ovary, papillate along the inner margin where it is split to the base, 1 cm. long, the lower swollen portion pale orange-yellow or warm buff (Ridgeway), 3 mm. wide, the limb with a faint rosy tinge when young, the apex greenish. *Ovary* glabrous, rounded, mounted on a flattened buff or pinkish gynophore about 5 mm. long, at the base of which *nectar* is copiously produced, enclosed within the perianth ; *style* glabrous, about 2 cm. long, geranium-pink to begonia-rose (Ridgeway) becoming paler in the upper third where it curves to a green oval convex disc with a central projecting stigma. *Fruit* unknown.

Type specimen, from one of the plants presented by Miss BRIGGS to Wisley, in the Herbarium of the Royal Horticultural Society's Gardens, Wisley, Surrey.

Under the name *Grevillea × semperflorens* this shrub was exhibited by Miss BRIGGS at the fortnightly show of the R.H.S. at Vincent

* See MUSSON, C. T., and FLETCHER, J. J., in Proc. Linn. Soc., N.S.W., ii. 122 (1927), and McLUCKIE, J., *ibid.* lv. 386–412 (1930).

Square on March 24, 1936; it is mentioned without description in this JOURNAL, 61, p. lxxxiv (May 1936), as a hybrid "*G. sulphurea* × *G. rosmarinifolia*."

Finally I must express my grateful thanks to Mr. W. T. STEARN, F.L.S., of the Lindley Library, who very materially assisted me in drawing up the description, and to Mr. A. D. COTTON, F.L.S., Keeper of the Herbarium, Kew, who kindly supplied the references to the work on *Grevillea* × *Gaudichaudii*.

NOTES ON NEW CHRYSANTHEMUMS.

By JOHN WOOLMAN, F.R.H.S.

[Précis of Lecture, November 24, 1936; LADY WIGHTMAN in the Chair.]

I HAVE been asked to give to you a talk on New Chrysanthemums, and therefore my remarks will not contain cultural details.

I have often heard it said that new varieties are not better than the old ones, and several instances of good older varieties are given in support of this idea. I agree that in some varieties it looks almost as though perfection had been reached, but even so where shall we get new colours and new petal types if we do not proceed with the raising of new varieties? Even if we agree that some older varieties are wonderful, in their type, the vigour of the stock will wear out in time. I would ask my hearers to think what a dull world it would be if fashions did not change. The very diverse forms and types of the Chrysanthemums lend an added interest to the raising of new varieties.

There are two ways of gaining new varieties: firstly by cross pollination, and secondly by sports. Pollination or cross fertilization as practised by the specialist will result in many diverse and unique forms, but the percentage of good varieties will be few. Sports are the gift of Nature, and will show often in the least expected places.

I am sure that great advances have been made even during the last five years, and varieties which were considered first class five years ago fail to raise comment now. Remarkable breaks in form or colour seem to crop up periodically. Taking the outdoor varieties, what a distinct type is shown in the varieties of the Pearson and Page families so noted for their freedom of flowering, long stems and scarcity of foliage. I venture to say that this break or type revolutionized the early Chrysanthemum as a market flower. Another and later example being the *Précoce* family, which has given us most wonderful colourings, a dwarf compactness coupled with very early flowering, and at the same time a good stem and small foliage. Many similar examples can be instanced in regard to the October and November indoor varieties, and I think all will agree that 'Edith Alston,' 'Coralie,' 'Dante,' 'The Ace,' 'Windsor Gold,' and the dwarfer types such as 'Fifi' and its sports, 'Prosperity,' 'Lydia,' etc., have shown us great improvements on older existing varieties.

On looking into the large Japanese varieties, who would deny that 'Henry E. Trueman,' 'Clara Trueman,' 'Sir Austen Chamberlain,' 'Henry Woolman,' and 'Hugh Mitchell,' not to mention others, have easily superseded older varieties in their respective colours?

In the December and Christmas varieties again, I would point to the great advance made by such varieties as 'American Beauty,' 'Jane Ingamels,' 'Pink Distinction,' 'Friendly Rival,' 'May Wallace' and its sports. In the Single section many new varieties have been raised, and the aim of the raiser is directed towards making this beautiful type of much dwarfer habit. The following newer varieties are usually not more than four or four and a half feet in height: 'Caroline,' 'Rivelin,' 'Jean Batten,' 'Kimberley Crimson,' 'Ideal,' 'John Wycliffe.'

Therefore I believe that I have made out a case for new varieties, and that ever-changing fashions demand a continuance of the specialists' good work.

PLANTS TO WHICH AWARDS HAVE BEEN MADE.

Brownea × Crawfordii. F.C.C. January 12, 1937. From the Director, Royal Botanic Gardens, Kew. *Brownea* is a tropical American genus of ten species, forming small trees with showy flowers and large pinnate leaves, often brightly coloured while young. The present hybrid was raised as the result of a cross between *Brownea grandiceps* and *B. macrophylla*, made by the late Mr. Crawford of Lakeville, near Cork, a successful cultivator of these and other rare plants. The bright, salmon-rose flowers are closely packed in globose heads 10 inches across, which are borne at the tips of relatively slender, brown tomentose stems. Each leaf has twelve elliptical, glossy leaflets about 8 inches long and of papery texture.

Crocus Sieberi albus. A.M. January 26, 1937. From E. A. Bowles, Esq., M.A., Waltham Cross. Most of the forms of *Crocus Sieberi* have flowers of delicate colouring, their beauty often enhanced by richly contrasting colour on the outer segments; but none is more chastely beautiful than this seedling, whose large flowers, except for a broad orange band in the throat, are of pure, glistening white throughout. Like many another *Crocus* of outstanding merit, this was raised by the exhibitor.

Cypripedium × 'Angel Luscombe' var. 'Ceylon.' A.M. January 26, 1937. This well-formed flower has a large dorsal sepal that is mainly deep-rose, shaded with crimson at the base, and with a whitish margin. The yellowish petals and labellum are shaded with mahogany-red. It results from the crossing of *C.* × 'Cardinal Mercier' with *C.* × 'Chardmoore,' and was shown by Messrs. Armstrong & Brown, Tunbridge Wells.

Cypripedium × 'Diana Broughton,' Lynbrook var. A.M. January 12, 1937. A charming flower of model form. The dorsal sepal is white with a greenish base, while the petals are light yellow with a waved margin, and the labellum a deeper yellow. Obtained by crossing *C.* × 'Doris Black' with *C.* × 'Grace Darling.' Exhibited by H. P. Lawson, Esq., "Lynbrook," Knap Hill, Woking.

Cypripedium × 'Gatton Prince.' A.M. January 12, 1937. An attractive flower of large size, the prominent dorsal sepal white with an apple-green base, and the broad petals and labellum honey-yellow with light brownish venation. The result of crossing *C.* × 'Moonlight' with *C.* × 'Walter Moore.' Exhibited by Sir Jeremiah Colman, Bart., Gatton Park, Reigate.

Cypripedium × 'King George VI.' A.M. January 12, 1937. A distinct flower in which the round dorsal sepal is mainly crimson, bordered with white, the petals are rich yellow with mahogany-red

markings, and the labellum yellowish. Obtained by crossing *C.* × 'Chrysostom' with *C.* × 'Hera.' Exhibited by Messrs. Armstrong & Brown.

Euphorbia fulgens pallida. A.M. January 12, 1937. From Messrs. Englemann, Saffron Walden. *Euphorbia fulgens* received the F.C.C. on January 14, 1930, and is described in this JOURNAL, vol. 51, p. cxlvii. The variety originated in cultivation as a sport some seven years ago and closely resembles the type except in the colour of the cyathium, which is a bright, clear orange.

Helleborus Kochii. A.M. January 26, 1937. From G. P. Baker, Esq., V.M.H., Sevenoaks. A very large and handsome oriental species from the south coast of the Black Sea. The radical leaves, some of which measure 19 inches in diameter, form a striking evergreen rosette, from the centre of which, between December and April, arises a succession of tall, leafy, flowering stems bearing large, greenish-white blossoms.

Iris 'Desert Gold.' A.M. June 8, 1936. Raised by Dr. James H. Kirkland, Vanderbilt University, Nashville, Tennessee, U.S.A., and sent by Mrs. E. A. S. Peckham, Davenport Neck, New Rochelle, N.Y., U.S.A. Vigorous, and of rapid increase, with erect foliage, 20 inches high. Flower stems erect, straight, 30 inches high, 6-flowered, branches of medium length. Flowers large, well-proportioned, stiff. Standards domed, $2\frac{1}{2} \times 2\frac{1}{2}$ inches, soft canary-yellow. Falls almost horizontal, $2\frac{1}{2} \times 2\frac{1}{2}$ inches, soft pale canary-yellow with deeper and distinct veins at beard and on haft. Beard orange. Flowering for nineteen days from May 27. Introduced in 1929 by Dr. J. H. Kirkland. Class VIII b.

Iris 'Golden Hind.' A.M. June 8, 1936. Raised, 1931, introduced and sent by Mr. H. Chadburn, Middleton, Saxmundham, Suffolk. Plant of moderate growth and a free increaser, with erect foliage, 20 inches high. Flower stems not freely produced, erect, 24 inches high, 6-flowered, branches short. Flowers large, stiff, well-proportioned. Standards domed, $2\frac{1}{2} \times 2\frac{1}{2}$ inches, of good substance, deep rich golden-yellow. Falls horizontal, $2\frac{1}{2} \times 2\frac{1}{2}$ inches, deep rich golden-yellow self. Beard orange. Flowering for fourteen days from June 1. 'Gold Imperial' × 'W. R. Dykes.' Class VIII a.

Iris 'Joanna.' F.C.C. June 8, 1936. Raised 1930 and sent by Major F. C. Stern, O.B.E. Described R.H.S. JOURNAL, 60, p. 456. A.M. 1934. Class IV b.

Iris 'Mesartim.' A.M. June 8, 1936. Raised 1928 and sent by Messrs. G. Bunyard, Maidstone, Kent. Described R.H.S. JOURNAL, 60, p. 457. Class IV b.

Iris 'Rangatira.' A.M. June 8, 1936. Raised by Miss Jean Burgess, Waikanae, Wellington, N.Z., and sent by G. L. Pilkington, Esq., Woolton, Liverpool. Vigorous, and of rapid increase, with erect foliage, 24 inches high. Flower stems erect, straight, 42 inches high, 8-flowered, branches of medium length. Flowers extra large, well-proportioned and stiff. Standards domed, $3\frac{1}{2} \times 2\frac{1}{2}$ inches,

margins waved, dull bronze with a violet flush. Falls straight hanging, $3 \times 2\frac{1}{2}$ inches, deep rich wine-purple, veins distinct, brownish on white, at beard and on haft. Beard orange. Flowering for two weeks from June 2. Class VI c.2.

Iris 'Shot Silk.' A.M. June 8, 1936. Raised and sent by the Orpington Nurseries, Orpington, Kent. Plant vigorous and of rapid increase, with erect foliage, 18 inches high. Flower stems erect, somewhat zig-zag, 30 inches high, branches short. Flowers of medium size, stiff and well-proportioned. Standards slightly domed, $2\frac{1}{2} \times 2$ inches, soft pale rose-pink shot with pale bronze, base pale bronze. Falls drooping, $2 \times 1\frac{1}{2}$ inches, bright pale rose-pink shaded pale heliotrope, haft veined and flushed pale bronze. Beard orange, tips of hairs bronze. Flowering for two weeks from June 2. Class VI a.2.

Iris 'Stratosphere.' A.M. June 8, 1936. Raised by F. F. Donahue, Esq., Newton Lower Falls, Mass., U.S.A., and sent by G. L. Pilkington, Esq., Woolton, Liverpool. Vigorous and of rapid increase with erect foliage, 20 inches high. Flower stems erect, straight, 30 inches high, 8-flowered, branches of medium length. Flowers large, well-proportioned, stiff. Standards domed, $2\frac{1}{2} \times 2\frac{1}{2}$ inches, clear Oxford-blue. Falls horizontal, $2 \times 2\frac{1}{2}$ inches, clear Oxford-blue, veins on haft distinct, bluish-brown. Beard whitish. Flowering for two weeks from June 1. Class V b.

Nephrolepis Hillii. A.M. January 26, 1937. From Messrs. Hill, Edmonton, N. 9. This highly decorative greenhouse fern is a very vigorous form of *Nephrolepis exaltata*. It rapidly forms a dense cluster of erect fronds nearly a yard long and 3 to 4 inches wide, closely set over almost their entire length with finely cut and frilled pinnae of rich colour and firm texture.

Odontoglossum \times 'Neron' var. 'Jean Campbell.' F.C.C. January 12 1937. This attractive hybrid, the result of crossing *O.* \times 'Llewellyn' with *O.* \times 'Rosina,' bore an erect spike of 13 well-formed flowers, which are heavily blotched with crimson-purple on a rose-tinted ground. From H. S. Wharton, Esq., "Shalston," Templewood Avenue, Hampstead.

Odontonla \times 'Andromeda' var. 'Ruby.' A.M. January 12, 1937. This hybrid bore a somewhat extended spike of 8 flowers. The sepals and petals are crimson-rose with whitish tips, while the wide labellum has a red-brown basal area and a yellow crest. The result of crossing *Odontoglossum* \times 'St. James' with *Odontonla* \times 'Duchess of York.' Exhibited by Messrs. Charlesworth, Haywards Heath.

Primula 'Schneekissen.' A.M. January 26, 1937. From Messrs. Wood, Taplow. A good white-flowered *Primula* of the Juliana type, for the rock garden and alpine house. The flowers are of medium size, have pale yellow eyes, and are freely produced, some singly and others four or five together on short peduncles.

Rhododendron \times 'Fulgurb.' A.M. January 26, 1937. From E. J. P. Magor, Esq., St. Tudy, Bodmin. An attractive, early-flowering hybrid raised from *R. fulgens* \times *R. arboreum*, suitable for planting

where its flowers are sheltered from frost. The leaves are 5 or 6 inches long, oblanceolate with recurved margins, lustrous above and somewhat hairy beneath. The bright, rosy-crimson flowers are closely set, about fifteen together, in a neat truss.

Viburnum fragrans nanum. A.M. January 26, 1937. From Messrs. Elliott, Stevenage. This dwarf variety of a well-known and popular shrub combines the good qualities of the type with compact, bushy habit. It is thus very suitable for the rock garden or for the front of the shrub border.

Viburnum grandiflorum. A.M. January 26, 1937. From Lord Aberconway, V.M.H., Bodnant. This very attractive, though uncommon, species belongs to a small natural group of which *V. fragrans* is a familiar example, but it may be readily distinguished from that species by its much larger, long-tubed flowers. The buds are bright rose-pink, becoming paler and sweetly scented when fully expanded. It was introduced to cultivation in this country by Mr. R. E. Cooper, who collected seed in 1914 in Bhutan.

THE AWARD OF GARDEN MERIT.—XXXIX.*

By F. J. CHITTENDEN, F.L.S., V.M.H.

216. PEROWSKIA ATRIPLICIFOLIA.

Award of Garden Merit, April 1, 1935.

Perowskia atriplicifolia has two claims to distinction. It has grey-green foliage, and it has violet-blue flowers. Either of these characters, provided they are combined with good habit, is a sufficient passport to an honoured place in the garden, still more a plant in which both are combined.

P. atriplicifolia grows from 3 to 5 feet in height with long stiff branches bearing coarsely-toothed opposite leaves, grey-green, up to 2 inches long and a third as wide, and terminated by a long branched inflorescence consisting of a number of opposite leafless spikes each between 2 to 5 inches long. Stem and inflorescence alike are covered by short down and against this the violet-blue two-lipped flowers, each $\frac{1}{2}$ inch long, stand out and give a beauty to the plant which is rarely equalled. It has the further merit of flowering in August and September when shrubby plants in flower are few.

Although it is a shrub in our climate, much of the shoot dies back in the winter and it should therefore be pruned in spring to a little behind the part that has died. It must have sun and good drainage, and requires a good loamy soil to do well, and as the width of the plant is not great several should be planted together. The best way to increase it is by cuttings struck in a sandy compost in a close frame in July.

P. atriplicifolia is a native of the Himalaya and Afghanistan. It is figured in the Botanical Magazine, t. 8441.

217. SENECIO LAXIFOLIUS.

Award of Garden Merit, July 6, 1936.

Several grey-leaved plants have already appeared in these notes, but no apology is needed for adding to their number. Grey foliage is always useful in both the shrub border and the herbaceous border as well as on the rock garden. So long as it is used with judgment it not only has a beauty of its own, but it enhances the value of dark green and serves to prevent a clash of colours among flowering plants. Its value in these directions need not be enlarged upon.

* The notes on the first hundred plants to receive the Award of Garden Merit have been collected from our JOURNAL, vols. 47 to 53, and published as a pamphlet, price 1s. For subsequent notes see vol. 54, pp. 218 and 423; 55, pp. 121 and 276; 56, pp. 80 and 245; 57, pp. 65 and 354; 58, pp. 171 and 400; 59, pp. 131, 308, 360, 406, and 449; 60, pp. 89 and 545; and 61, pp. 94, 138, 225, 265, 298, 358, 393, 443 and 486.

The grey effect may be due to the presence of wax on the leaf-surface—"bloom"—or it may result from a covering of silvery hair, and it is to this that *Senecio laxifolius* and several other species of *Senecio* from New Zealand owe their grey effect. Among these grey-leaved *Senecios* of New Zealand two have no undulations at the leaf-margin, *S. laxifolius* and *S. Greyi*, species which have been, and are likely to be, confused in gardens and in garden literature. They are clearly nearly related. *S. Greyi*, however, was described from specimens found in the North Island and is said to be glandular-hairy in the inflorescence, while *S. laxifolius* is eglandular, and to have leaves wider in proportion to their length, and therefore rounder than *S. laxifolius*, a plant from the South Island, where also it attains to a much higher elevation than does *S. Greyi* in the North Island.

This narrower-leaved species is, as might be expected, more hardy than the wide-leaved one, and whether it be really a distinct species or merely a geographical race, it is clearly the one to choose for planting over the greater part of this country, leaving the larger-leaved *S. Greyi* for districts near the sea, and the very mild inland valleys where the broad-leaved shrubby *Veronicas* from the same country thrive.

Both *S. laxifolius* and *S. Greyi* have panicles of inch-wide clear yellow daisy-like flowers in summer, and sometimes also in autumn, and are very handsome, shapely bushes from 2 to 5 feet in height. The leaves, at maturity green above except at the white-felted margin and quite white beneath, are about $1\frac{1}{2}$ to 2 inches in length, and spring from white-felted shoots on leaf-stalks also felted and about $\frac{1}{2}$ inch in length.

S. laxifolius will grow in any well-drained soil, and is the better for a place in the sun sheltered from rough and biting winds. It is easily propagated by cuttings.

BOOK REVIEWS.

"Nature in Britain." 8vo. 250 pp. (Batsford, London, 1936.) 5s.

This well-illustrated and well-written survey of Nature in Britain contains an introduction by H. Williamson, followed by an account of British mammals by Frances Pitt; of British birds by Seton Gordon; of British reptiles and amphibians by E. G. Boulanger, who also writes of pond and stream life; of insect life by L. C. Bushby; of British trees and shrubs by R. St. Barbe Baker, who includes some that are not truly wild; of flowering plants by Robert Gathorne-Hardy, and of fungi by Edward Gathorne-Hardy.

The last chapter is very short, but all are interesting and together they make a book very suitable to put into the hands of the budding naturalist.

"Scientific Study of the Soil." By N. M. Comber. Ed. 3. 8vo. vii + 206 pp. (Arnold, London, 1936.) 7s. 6d.

This little book is intended for agricultural and horticultural students. It has already been noticed in this JOURNAL, and this new edition brings its matter up to date.

"Your Flower Garden." By H. A. Day. 8vo. viii + 151 pp. (Methuen, London, 1936.) 3s. 6d.

A book with the object of telling "How to grow perfect flowers in town and country." It contains a great deal of useful information, but like many another gardening book it leaves us to suppose that, for instance, *Lilium giganteum*, *L. croceum*, *L. rubellum* will all succeed in similar situations and soil. To promise too much, at any rate to the beginner—the veteran knows enough to suspect promises—only leads to disappointment and sometimes despair, which is a pity. There is the usual crop of misspellings of plant names.

"Hardy Californians." By Lester Rowntree. 8vo. xiv + 255 pp. (Macmillan, New York, 1936.) 18s.

Here is an enchanting book that perhaps some may say I should not be reviewing because, having wandered with Lester Rowntree on two different trips, I am prejudiced in its favour. Perhaps I am, because I happen to know how much hard, grinding work has gone to the compilation of a book which reads so freshly and pleasantly that one is apt to forget the old adage "Ease in writing comes from art, not chance." Not only is there the actual writing of it but there is the collecting of the data, entailing travels over thousands of miles up and down the great State of California, watching, noting, selecting from all sorts of scenes, either "perched on a Sierra peak" where she wrote a "perfectly good preface" and left it under a boulder, to return to those voluminous notes the result of years of hard study which have produced this informative book on a subject far too little known both in California and England. The author speaks of many places: "Storm-lashed spots, sheltered corners, sweet with the repetitious litanies of bird song; the hot glistening floor of the desert; sands and bluffs by the sea; the fragrant chaparral; the caves and canyons of lonely islands; the dense dark shade of the Redwoods; the windswept mesas; the hymnlike music of the mountain conifer forests." Many of these I have seen with her and loved as one must love the California that lies away from the beaten highways and the glare of film studios.

She is right in saying it is difficult to write of the flora of that wonderful land, for "the spirit of a Californian wild flower in its own home is something not easy to put into words." The unbelievable beauty and the masses in which flowers grow strike one dumb and make one's pen falter. Lists of plant names kill any gardening book, but she says "This is not another garden book." As a matter of fact it is a delightful account of a plant lover's peregrinations in fairyland. There are names of plants, but no dry lists with botanical minutiae, and she has something racy to say about many matters, while she provides a wealth of information which is invaluable. She has wandered with her eyes open and her mind alert for artistic effects, as I well know when we toured in the famous

but—saving her presence—not wholly reliable car. So much were her eyes open to the beauties of Nature that the eccentricities of the dirt roads and precipitous tracks, with many hundred feet of sheer drop, were apt to be overlooked, to our mutual peril and my terror. She has crashed one car down an abyss, jumping out just in time to save herself, and has found herself stranded on other occasions till some chance wanderer came along. There have been the thrilling escapes of the plant hunter in wild country, which are all faced not by some hefty man but a tiny, frail, woman who meets them with smiling courage and a keen sense of humour. It is the result of all these things that she gives us in this book.

She mentions the collection of tools, books, old newspapers, bags etc., that accompany her on these trips. Well do I know that astounding mass of stuff (plus odd pieces of clothing overlooked in the original packing), and how often Professor Jepson's invaluable Manual has been almost lost, through being decanted from the running-board as we rummaged in the bowels of the car for something we couldn't find till everything was hurled out on to the grass of the roadside, or the hot sand of the desert. Then, when it came to repacking, well, somehow the stuff got back into the car, though neither of us was troubling much about tidiness. That's the joy of such trips. You needn't be tidy or civilized till you strike—very regretfully—the highways with their marvellous wide roads and perfect surfaces.

To the untravelled Briton it may seem a bit startling to read of California's 168,297 square miles of area with altitudes ranging from 276 feet below sea level near Death Valley (of whose queer flora there is a fine collection at Kew) to the abrupt rising of Mount Whitney (14,502) directly from that low level. It is this immense variety of altitude and great extent of ground which give to California an unique flora in which are blended the sub-tropical, the temperate and the alpine. No wonder it is a difficult thing on which to write a book that is really comprehensive. And this Lester Rowntree has gone as near doing as anybody can, unless they wish to confine themselves to a list of names and dry botanical facts, which she has avoided, though she gives sufficient botanical information to make the book a serious work for the botanical as well as the horticultural seeker after knowledge. Not only do we have the description of the flora, but there are laughable items on the fauna, as in her account of the lizard who liked being sung to. I know that singing of hers, which used to burst forth unexpectedly whenever she was happy or the car was running well, and I suppose the lizard, realizing this mood, was duly sympathetic. I was delighted to find my own dislike of *Drabas* endorsed on page 31, also her whole-hearted contempt for that floral abomination, *Leontopodium alpinum*. Of all the silly plants to make a fuss over this is surely the silliest. She has, on the other hand, a strong recommendation for the *Erigeron* family, which people are apt to overlook, and, as she says, both they and the *Astragalus* are well worth being given a good trial. *Astragalus coccineus* is one of the most astounding plants I have ever seen, or ever expect to see, with its intense scarlet flowers and grey foliage. Did I not try and send it home, but the postal authorities killed it by their abominable dilatoriness and red tape. There is a chapter on the *Eriogonums*, regarding which she said to me more than once that she wished some expert like Professor Jepson would write a book as they have never been properly classified or studied. I have found quite a lot of them hardy in Essex, notably *Eriogonum rubescens* and *E. nudum*, both a good pink. To Gilias she gives the praise they richly deserve, though here I must pick a bone with her, as I don't think it quite fair to put *G. californica* into a book dealing with hardy Californians. It is an enchanting thing but by no means hardy, though I have grown plants up to two feet or more in height and the same in diameter, but only by cossetting them with a sheet of windolite in winter, to save them from wet rather than cold. Even so the winter of 1935-36 did them all in, alas!

As she says, "it is a perilous piece of work to fling into one chapter handfuls of perennials . . . growing in varying localities up and down the State," but the book couldn't be continued indefinitely, so the beautiful *Diplacus* don't get their full share of notice. Once seen straggling about in every shade of crimson, pink, yellow and buff, they are never forgotten. The *Salvias* form another wonderful note of colour, as do the *Oenotheras*, ranging from the minute *Oenothera bistorta* to the bushy forms, all adding a golden note to the countryside.

The *Pentstemons* well deserve the chapter devoted to them and many of them are well known over here and satisfactorily grown, though I find few people seem to know the enchanting *Pentstemon antirrhinoides* when they see it in my garden. Lupins would need many chapters to deal with them in full. Their name is legion, their beauty indescribable when spring brings them out in their vast masses. *Lupinus albusfrons* I quite agree with the author is one of the best, but not one of the hardest in England. It is well worth trying in favoured gardens, though it must have warmth, shelter from winds, and careful staking, being extremely

brittle. But any amount of trouble is worth while for a plant that blooms right through the summer and into November with great spikes of purple-blue flowers set in a mist of silver-grey foliage. Everybody makes a bee line for it in the garden, I find. A plant that will, I think, let you down every time is *L. Steersii*: a divinely lovely thing, but not for English gardens. Only one year did it succeed with me and then it declined, without thanks, every attempt to grow it. *L. nanus* on the other hand is the ideal annual, floriferous, long lasting and fragrant. In the chapter "North of San Francisco" we reach that most impossible and enchanting plant *Calypso borealis*. Has anybody "done it" really well and permanently in England? If so will they publish their methods, for they would be doing the best of good turns ever done to gardeners. I don't wonder the natives call it "Devil's Bliss." I could call it far harder names. Of *Lewisia* I am glad to see Mrs. Rowntree mentions their liking for "filtered shade." That is what I saw them getting in Western Canada. But in England gardeners will persist in scorning the poor things in the hottest spots of the rock garden. "Filtered shade" is, I am sure, better for them and for many of the South African as well as the Californian plants, because, as she points out, the Californian flowers are over before the full force of the summer sun reaches them, and this equally applies to many South Africans. I know how completely baked out California can look about December after a hot dry summer, and it is impossible to believe that in a few weeks—say three months—the dust-coloured land will be ablaze with stretches of marvellous flowers, provided there has been sufficient rain during autumn and winter to bring the hidden seeds to germination. In that way California is as uncertain as women are credited with being. Given good rains the blossoming is incredible. Given poor, or no rains, there is hardly anything to see, and many visitors to the country who happen to have fallen on a bad year say there is nothing to write home about. *Oenotheras*, *Asclepias*, and practically every flower that I have ever heard of as indigenous, all find their places in the pages of this book, as do the native bulbs which Carl Purdy has done much to popularize. As for the *Calchorti* and the *Erythroniums*, it is hard for anybody who has seen them growing on the edges of the chaparral and the wooded slopes, to write of them with restraint. There is a chapter devoted to annuals and their cultivation which is excellent. For myself I have tried out a good many. Some succeed, but of course those one most hankers after are, to say the least, "miffy," such as the rainbow-hued *Orthocarpus purpurascens*, the Mohaveas, and the little desert *Chaenactis*. Still, most of the small annuals are a joy for ever—or perhaps, since they are annuals, one should say for as long as they last and one shouldn't ask for more.

The final chapter is given up to the growing of Californian plants, which she has limned for us with a facile and humorous pen, and it is a chapter full of wisdom which brings to a close a study of the Californian wildlings that should find its way on to the shelves of all flower lovers whether in the United States or in England.

EVELYN BYNG OF VIMY.

NOTES AND ABSTRACTS.

Bulbophyllum orthoglossum Wendland and Kraenzlin. By V. S. Summerhayes (*Bot. Mag.*, t. 9459; Nov. 1936).—An epiphyte native in the Philippines characterized by the large, bifurcately arranged, flattened bracts and its relatively few large flowers. A plant for the warm orchid house, easily propagated by division, 8 to 12 inches high, with up to 5 richly-coloured flowers, in which yellow and red predominate, at the apex of the peduncle.—*M. S.*

Caralluma lutea N. E. Br. By E. P. Phillips (*Fl. Plants S. Afr.* t. 621; July 1936).—The *C. Vansonii* is regarded as a large-flowered *C. lutea*, a species with starfish-shaped yellow flowers up to over 4 inches in diameter from the Cape, Transvaal and Bechuanaland. *C. lutea* is also figured at t. 379.—*F. J. C.*

Catalpa Fargesii Bur. forma *Duclouxii* (Dode) Gilmour. By J. S. L. Gilmour (*Bot. Mag.*, t. 9458; Nov. 1936).—A hardy tree from western China, up to 65 feet in height with pink-dotted pale pink or white flowers with yellow-banded throats, differing from the type *C. Fargesii* in its glabrous nature and more spreading inflorescence. It was formerly named *C. Duclouxii*.—*M. S.*

Cuttings, Effect of Callus-paring upon root production. By E. E. Kemp (*Gard. Chron.*, 14 March 1936, pp. 168-70; with 8 figures).—These carefully conducted experiments are clearly illustrated by photographs, most of which show the microscopic details. The plants used are *Camellia Sasangua* and *Viburnum grandiflorum*. The conclusion reached is that callus-paring removes the potentiality of root formation in the *Camellia* and has no influence on the rooting of the *Viburnum*.—*E. A. B.*

Dicoma anomala Sond. By E. P. Phillips (*Fl. Plants S. Afr.* t. 625; July 1936).—A composite widely distributed in S. Africa, decumbent, perennial, subwoody, with very variable leaves both in form and hairiness. The sharp-pointed bracts of the involucre and the white pappus are the most conspicuous features. *F. J. C.*

Elm Notes, 1935. By Helen Bancroft (*Gard. Chron.*, 15 Feb. 1936, p. 104; 25 April, p. 268, and continued 15 Aug. to 19 Dec.; with figures).—These notes follow the series published in this JOURNAL in 1934. The work was undertaken in the hope of discovering some external character of standing Elm timber that might be correlated with qualities that render the wood more suitable for use.

The ease with which Elms hybridize and the incalculable variety of the resulting combinations of characters render this end difficult to attain. A summary of the main points revealed by the research is given on p. 446.—*E. A. B.*

Helixyra simulans N. E. Br. By N. E. Brown (*Fl. Plants S. Afr.* t. 623; July 1936).—*Helixyra* differs from *Moraea* by its membranous bracts which are distinctly veined, by the ovary and fruit concealed within the bracts tapering to a long slender beak and by the ripe capsule being membranous. *H. simulans* (= *H. flava* Salisbury) corm buried as much as 2 feet; flowers four to six with pale mauve spots.—*F. J. C.*

Lily Notes. By H. F. Comber, etc. (*Gard. Chron.*, 1936).

Lilium nobilissimum (*L. Alexandrae*) (15 Feb. 1936, p. 102; with 3 figures). Notes the persistence of the old stem and leaves and in another instance of two basal leaves, and in both cases the new growth appeared in mid-January.

Lilium × burnhamense Comber. Hybr. nov. (19 Sept. 1936, p. 212; with 3 figures).—Records the flowering of a hybrid raised from *L. neilgherense* fertilized by pollen of *L. Wallichianum*. It chiefly resembles the pollen parent, but has broader leaves, showing traces of the callose tip characteristic of *L. neilgherense*.

L. × Scottiae (*L. Willmottiae* × *Thunbergianum*) (26 Sept. 1936, p. 230; with figure p. 227).

L. Brownii (3 Oct. 1936, p. 249).—Two figures show capsules resulting from the crossing both ways of *L. Brownii* and *L. Brownii* var. *colchesteri*.

Lilium japonicum (1 Feb. 1936).—A beautiful coloured illustration.

L. tigrinum Diploid (26 Sept. 1936, p. 230; with figure). By Miss Isabella Preston, Ontario.—A self-fertile diploid form of *L. tigrinum* var. *Fortunei*, for which the name var. *Diploid* is proposed.

Lilies in a New York Garden. By Helen M. Fox (12 Sept. 1936, pp. 197-8).—A pleasant account of the grouping and times of flowering of a large collection of Lilies.

Premature defoliation of Lilies.—In the issue of 25 Jan. 1936, p. 56, in A. Grove's annual review of Lily happenings of the preceding year was the statement that "it is not the case that damage to the stem or leaves of a Lily in any stage of its visible growth necessarily affects the bulb adversely."

This was questioned by H. F. Comber on 13 June 1936, p. 385, accompanied by three figures, showing ill-effects following defoliation caused by the many frosts of 1935.

The discussion was continued by A. Grove, 22 Aug., pp. 142-3, and H. F. Comber, 5 Sept., pp. 179-80, and shows how much ground there is for different views.

L. pardalinum: varieties and hybrids. By A. Grove (14 Nov. 1936, pp. 352-3; with figures).—*L. × pardaboltii*, Dimsdale's variety. A useful enquiry into the known facts concerning the origins of *L. Burbankii*, *L. pardaboltii* and *L. pardalinum giganteum*.

L. dauricum luteum (11 July 1936, p. 26).—A note on the history, variation and habits of this member of the Isolirion group.

L. × Marhan in Canada. By F. L. Skinner (18 July 1936, p. 38; with three figures).—An account of lately raised hybrids of *L. Marlagon* and *Hansonii*.

E. A. B.

Mutisia subulata Ruiz & Pavon. By J. R. Sealey (*Bot. Mag.*, t. 9461; Nov. 1936).—A shrubby climbing Composite from the central provinces of Chile up to 15 feet high, with narrow leaves up to 2½ inches long prolonged into a tendril, and large flower heads bearing about eight large-bladed scarlet ray florets bifid at the apex. Plant for the cool greenhouse.—M. S.

Pests, Garden: their detection and control. By G. Fox Wilson (*Gard. Chron.*, vol. c, 1936; figs.).—This useful series of articles is continued from vol. xcvi and previous volumes, recommencing on 5 Sept. 1936, p. 182. Further instalments occur in the issues for 19 Sept., 10 and 19 Oct., 5 and 19 Dec. The many excellent photographs of affected plants and the offending insects are invaluable for the detection of the criminals and practical mediums of control are supplied.—E. A. B.

Pterocarpus rotundifolius (Sond.) Druce (*Fl. Plants S. Afr.* t. 622; July 1936).—A small tree with panicles of yellow flowers and compound leaves of five leaflets alternately arranged. Native of the Transvaal and S. Rhodesia.—F. J. C.

Sorbus Prattii Koehne. By J. R. Sealy (*Bot. Mag.*, t. 9460; Nov. 1936).—A hardy shrub or small tree from west central Szechwan, eastern Kansu, and (?) north-western Yunnan, up to 20 feet high, with globose greenish-white fruits, differing from its nearest ally, *S. Koehneana*, in its smaller leaflets which are cobwebby-pubescent below, and smaller petals. Flowers and fruits well at Dawyck and Aldenham.—M. S.

Stapelia, A. and three *Carallumas* of tropical Africa [Sur un *Stapelia* et sur trois *Carallumas* de l'Afrique tropicale]. By Aug. Chevalier (*Rev. Bot. Appliquée*, xiv., pp. 262-275; illus.; 1934).—A little-known species, *Stapelia Decaisneana*, formerly referred to *Boucerosia* and *Caralluma*, is here redescribed from wild material collected in Senegal and the French Sudan; its provenance has hitherto been uncertain. *Caralluma tombuctuensis*, now known from Mauritania, Senegal, Niger Colony, French Sudan and the Algerian Sahara, is considered a subspecies of *C. retrospiciens*. *C. Dalzielii*, cultivated by the natives as a fetish-plant to save their yams from evil spells, is redescribed. *C. Mourstii* is a new species. These four are the only *Stapelias* at present known from French west tropical Africa.—W. T. S.

Stapelia jucunda N. E. Br. By E. P. Phillips (*Fl. Plants S. Afr.* t. 624; July 1936).—Allied to *S. parvipuncta* (t. 470). Flowers about an inch across, white with numerous small purple spots. Cape Province and Orange Free State.

F. J. C.

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THE CARE OF ORNAMENTAL TREES.

By A. D. C. LE SUEUR, B.Sc., F.S.I.

[Read January 26, 1937; Mr. F. R. S. BALFOUR, M.A., D.L., V.M.H.,
in the Chair.]

I PROPOSE this afternoon to deal with some of the problems that may arise where garden trees are concerned. Speaking generally, most garden tree problems and troubles can be separated into classes: There are problems of disease, problems set up by insect pests, by site, by atmospheric influences, and by the soil. Our information on these matters is very far from complete, and is to a considerable extent based on scientific research in connexion with forest and orchard trees. The reason for this is, first, that forest and orchard trees lend themselves to scientific investigation more readily than single trees as being less likely to be affected by complex conditions of environment and, as is only natural, more work is likely to be done on trees from which a monetary return is required. Then there is the question of age. Forest trees are removed when mature, or even before maturity is reached if they are saleable, and fruit trees are uprooted when their crops start to diminish, although actually as trees they may still have many years of life in them. With forest trees the aim is a crop of timber as quickly as possible, but with ornamental trees our aim is a life for the tree as long as possible.

From this it is easy to see that the arboriculturist is often faced with problems that the forester, working with species rather than with individuals, seldom, if ever, has to deal with, and for that very reason the correct measures to adopt are quite often none too easy to ascertain.

It is quite impossible in a short paper of this kind even roughly to cover the ground indicated by the title, and I have therefore picked out half a dozen problems that the garden owner may be faced with at some time or other, in the hope that such information as I have to give to you about them may be of interest and use.

Beech Disease.—I use this title deliberately as it is the term so often used. It is, of course, quite wrong, as the so-called disease is an insect: *Cryptococcus fagi*—the Beech coccus or scale. In appearance it is a tiny yellowish louse-like creature covered with white fluff, and without power of locomotion, which is found on the bark of beech trees, living on juices extracted from the bark. For years it has had a very evil reputation. GILLANDERS, a noted forestry entomologist, in fact, referred to it in 1903 as "one of the most dreaded pests of the arboriculturist," and it is still regarded as such by quite a number of people. GILLANDERS, however, states later on that he has "in practice been fortunate enough to be associated with healthy beech trees," so that his statement does not carry the weight it might otherwise have done. Quite recently I saw it described in a newspaper as a disease which ate away the inner bark and rotted the whole trunk, and which was caused by a tiny insect which bored into the bark and ate into the heart of the tree! Anyone without entomological knowledge reading this could hardly be blamed for pessimism regarding the future of an infested Beech.

Attacks are irregular both as regards period and severity, and whilst some trees may be covered, others in the vicinity are untouched or only lightly affected. One year it is present, the next it may be completely absent.

Present-day evidence goes to prove fairly conclusively that Beech coccus is a secondary agent only, following something that has already attacked the tree and lowered its vitality. BOODLE and DALLIMORE, working at Kew in 1911, came to this conclusion; J. W. MUNRO agrees with them, and my own experience bears this out as well. Some thirty years ago a committee from this Society went down to Burnham Beeches at the request of the Corporation of London to inspect the trees there, practically all, according to their report, being attacked, some lightly, some heavily, and in one area in particular, the young trees were very badly infested indeed.

For the past twelve years I have been studying the two thousand odd Beeches on this area very carefully, particularly as regards Beech coccus. During that time, to the best of my knowledge, not 1 per cent. of those trees have shown signs of serious attack, and whilst the insect is always there, it requires search to find it. What I have found is this: trees that are definitely attacked have shown previously signs of weakness in the leaf, or are growing on a river-bed gravel unsuited to them. I have noted that after mild winters the insect was more plentiful than after hard winters. Also that in bad cases the trees are either definitely infected with types of true fungi, or by large patches of slime fungi, and it is at these points that the

coccus seems to concentrate. I have also noticed that young trees badly barked at the base by squirrels have been badly attacked by coccus the following year. As a result of this and of observations in other beech areas, I am of opinion that the primary agent in most cases is drought, or some other interference with water supply, which weakens the tree in the first place and so encourages fungus and insect attack. Anyone who has examined Beech coccus under a high-power microscope will, I think, find it difficult to believe that the hair-like proboscis of such a small insect could do the damage claimed for it, even when the insect is present in large numbers.

The treatment recommended is usually a paraffin and soft-soap emulsion applied with a brush, which is certainly effective, but is expensive and slow and confined to accessible parts of the tree. I have heard of other treatments—of painting the trunk with tar, which would certainly kill everything on it, but would not improve its appearance. I have also heard of a case where straw soaked in paraffin was tied round the tree with wire and set alight. This killed both insects and tree. Personally I have found the application of a tar-oil winter wash to be quick, cheap and quite satisfactory.

For the past ten years I have worked with forestry students at the Royal Agricultural College, Cirencester, in the many hundreds of acres of Beech woods on Earl Bathurst's estate. These trees are on a most suitable soil, the oolite. They grow fast and are of fine quality. During the whole of that period I have had the greatest difficulty in finding examples of coccus attack suitable for demonstration. This is one instance amongst several, that, when Beech is grown on a soil in which sufficient moisture can be found at all times, coccus attack need not be anticipated.

Slime Fluxes.—Slime fluxes consist of slimy discharges from wounds and cracks in old and unhealthy trees, about which little appears to be known at present. They are very common and, whilst not doing great damage, they prevent wounds from healing and cause others by destroying the bark over which they flow. The actual liquid appears to be a type of sap containing various organisms both fungal and bacterial. The best-known types are :

1. *White Slime Flux*, found on Oak and Birch: a white opaque slime that exudes from below the bark and kills healthy bark as it flows over it.

2. *Brown Slime Flux*, found on Chestnut, especially on exposed wood, and also on Elm, keeping affected areas wet and preventing healing.

3. *Red Slime Flux* is common on old Beech, especially on pollarded trees. It starts as a glassy-looking liquid that gradually turns red, staining and killing large patches of bark. According to GAUMANN the colouring is due to the presence of a fungus known as *Ascoidea rubescens*.

All contain yeasts, the fermentation of which may attract ants, wasps and other insects in large numbers.

The only known treatment at present is a thick application of hot tar made in the dormant season, first cutting away all damaged bark. Brown Flux on Elm is sealed by callus wood, but is sometimes found emerging from the edge of a wound that has been heavily and correctly dressed. This is generally due to the fact that there has been a slight lateral bark shrinkage that has exposed a thin line of untreated surface.

Lichens are formed by certain types of fungus in combination with a low form of green plant known as an alga. When existing in quantities on a stem, lichens may interfere with the health of the tree by blocking the lenticels or "breathing points" in the bark. They may be removed by scrubbing with a hard brush, or by the application of an ordinary winter wash, such as "Mortegg" or "Abolene."

Lightning.—Owing to the fact that ornamental trees grow singly or in small groups, they are, taken as a whole, more liable to damage by lightning than those growing in woodlands. Lightning is the accepted name for electrical discharges from clouds to the earth. These follow the shortest course, and as tall objects such as trees provide the path of least resistance, they are most likely to be struck. Lightning is not a single flash, but rather a series of discharges developing millions of volts and lasting a fraction of a second only. The simplest way of explaining how these discharges occur is to imagine that a cloud carrying a positive charge of electricity is moving in the air, and below this in the earth is another cloud carrying a negative charge, following the upper one as it moves. When the attraction between the two charges becomes sufficient, they join, and the result is a so-called flash of lightning.

Although its action on trees has been studied extensively, there is still much to learn about lightning. It is usually considered that certain species of tree are more liable to be struck than others, and that smooth-barked trees such as Beech and Hornbeam suffer much less than Oaks, Elms and Pines; the reason given being that the smoother bark offers less resistance to the current and allows it to earth more quickly. It is also considered that the rounded top of the Beech offers no prominent point to attract the discharge.

The following is a free translation of an old Austrian rule :

" From the oak you must run,
The willow tree shun,
Under fir never rest :
The beech is the best."

Recent investigations both in Europe and the United States, however, show that the liability to damage by lightning is not a question of species, but rather one of isolation or depth of root system.

Damage may be done in various ways, perhaps the commonest, especially in Oak, being the tearing away of a strip of bark from the crown to ground level. In bad cases pieces of wood may be torn

out, or the whole tree wrecked. This action is considered to be due to the sudden conversion of the water in the tree to steam. In this connexion I once inspected a Poplar a few minutes after it had been completely wrecked by lightning—the wood was warm and steaming.

Another interesting case was a Weeping Wych Elm struck by lightning during an afternoon storm. The tree was in full leaf. It appeared undamaged, but within forty-eight hours every leaf had fallen, giving the tree a winter appearance. The branches reached the ground all round, and it is obvious that the current had earthed itself *via* the wet leaves and branches instead of *via* the trunk, which was quite untouched. The type of soil appears to have some influence on lightning strike. In Germany it has been found that the liability to damage on chalk and clay as compared with ordinary loam soils is as 1 and 7 to 22.

The behaviour of trees after being struck without extensive damage occurring varies a great deal. Hardwoods often recover, but Sycamore always seems weak and unhealthy. Conifers generally die in a few years.

When attempting to explain how a flash occurs I stated that the positive charge was in the atmosphere, the negative in the ground. Occasionally the conditions are reversed, the positive charge being the earth charge. This explains cases sometimes met with where groups of trees, especially Pines, start to die off one after the other, sometimes taking six or eight months to do so. Such trees have had their roots and trunk bases damaged to such an extent that they are unable to take up food solutions from the soil, the time taken to die naturally depending on the extent of the damage, which may, and often does, vary from tree to tree.

Treatment consists in cleaning up and protecting the wound or wounds, and if the tree appears to flag, manurial dressings should be applied to the roots.

Protection by means of conductors is seldom practised in England, but a good deal of work is done in the United States by means of copper or galvanized iron rods or ribbons extended as close as is practicable to the highest parts of the tree. These are attached by loose girdles to the branches, being left slack to allow for sway. The earth connexions radiate out in groups of three for a distance of from 10 to 20 feet, connected to a conductor wire that encircles the tree at the same depth. The idea of this is to pick up the ground current near the surface and well away from the trunk so as to avoid damage to the roots.

Dead branches will attract lightning as well as live ones, and the big dead limbs so often, too often, allowed to project from the top of the crowns of old trees are frequently the cause of damage and destruction.

Finally it must be realized that trees in the proximity of buildings may prove dangerous, as lightning is quite likely to leap from a tree to a wide wet roof as being a quicker and easier way to the ground.

Injury caused by Electric Current.—The bark and sapwood of ornamental trees occasionally suffers from damage when brought into contact with overhead transmission lines. Branches are chiefly affected, as being more likely to make contact owing to neglected pruning, but in some cases trunks are damaged by wires that have been run close to them without satisfactory insulation. The actual damage is due to burning, the resistance of the wood causing considerable heating when contact is made. Low-voltage alternating current seldom causes much trouble, but direct currents of high voltage may, and do, make large wounds, especially if the leakage takes place in wet weather, the water acting as a conductor.

When treating wounds of this kind the damaged bark must be cut right out into obviously live material. If the charring is deep, say over a quarter-inch, there is no need to cut it out as the wood will be sterile and will stand. Thin charring is best scraped or cut away. The wound is then dealt with in the ordinary way.

The practice of using trees as a substitute for transmission poles is a bad one and should be avoided when possible. Branches should be kept well clear of wires, and should be pruned by trained men who realize that they swing oftener from side to side than up and down.

Grading.—Problems occasionally arise in connexion with the removal or addition of soil around the stem of a tree owing to alteration in level due to grading. In one case the soil level will be lowered, exposing part of the roots and possibly necessitating partial removal of them. In the other the soil level is lifted, which means piling earth around the stem and artificially altering the depth of the root system. All these are undesirable.

In all cases the point to study before taking action is the type of root system. These vary, some, such as Poplar and Elm, being shallow and far-reaching, others, such as Oak, growing deeply with a pronounced central or tap root, whilst Beech is an example between the two, having no tap root but strong roots growing at a pronounced angle. The commonest problem is the saving of trees where the cutting necessitates removal of soil on one side only to any depth. Deep-rooted trees such as Oak have had up to 2 feet of soil removed without damage in such cases. Elms are different, and at such a depth it would probably be necessary to cut roots. The question of safety is, of course, all-important, and the amount of work depends largely on the degree of exposure.

Removal of soil all round can seldom be done with a satisfactory result, and the best plan is to leave as wide an area as possible around the base, keeping it in place with a dwarf wall of masonry, brick or timber. Roots must be cut cleanly away and the stumps dressed with creosote and thick hot tar.

In cases where the soil level is to be raised, action depends on the soil itself. In light, well-aerated soils trees may be buried several feet without damage, but in clays the consequent cutting off of air

supply nearly always results in the death of the root system in course of time. Clay piled against the bark leads to decay.

The action suggested is as follows :

(a) To leave a hollow space between tree and "fill" a foot or more in width, this being kept open by means of a dwarf wall, with a grille set above it to prevent the gap being filled with leaves and other rubbish ;

(b) The infinitely preferable method known as "ventilated filling."

In this case the soil around the tree is first roughly broken up and leaf soil is worked in, and a rough stone or tile drain run from the lowest corner to a satisfactory outlet, which may be a ditch or, in the case of a road, to the ballast below. This point is important, as otherwise water from the surrounding soil will gradually fill up the treated area and stand in it, doing the roots no good at all. Draining is unnecessary on light deep soils or on areas where there is sufficient fall to run soil water off naturally. On the dug area a 12-inch layer of small ballast or gravel is spread from the trunk to a yard beyond the branch tips. This layer is then added to by sloping from the circumference to a point on the trunk a few inches below the new soil level. If the work is to be really thoroughly done, air vents should be added, consisting of 4-inch drain-pipes set vertically, stretching from soil level well into the ballast below. They should have perforated covers in the tops. These should be set towards the outer edge. With a tree having a branch spread of 50 to 60 feet, four pipes should be used ; under that diameter three or even two may be put in, according to the size of the tree.

Plugging.—More often than might be imagined, a curious and apparently age-old practice is met with. I am referring to the practice of boring holes into a tree trunk and inserting substances with the idea that they will spread through the tree, presumably being carried by the food solutions as they ascend from the roots. The most usual substance is flowers of sulphur inserted into a hole or holes 2 or 3 inches deep, the opening of which is in nine cases out of ten closed with a cork. I have found Beech trees treated in this way with the idea that it will prevent attack by fungus diseases. How exactly the sulphur is carried into the heart-wood—the part of the tree most generally attacked—is not explained, and the fact that food solutions do not ascend in the heart-wood is apparently overlooked. Further, whilst admitting that sulphur is a fungicide, the view taken that an ounce or two of sulphur will successfully protect a hundred cubic feet of timber appears somewhat optimistic. I may add that I have opened up filled trees treated in this way and found that the only areas of decay were situated around the bore-holes. Even to-day one sees this practice recommended as a cure for trees attacked by Beech coccus, the idea being presumably that the sulphur spreads into the bark and juices and so kills the insects. Personally it is my conviction that, where cures are claimed, recovery has been due to something else.

I recently found a large stag-headed Oak which had been "plugged" with garlic, presumably as a stimulant, and I believe I am correct in stating that this process was intentionally carried out at that period known as "the full of the moon."

I do not say that these practices are utterly useless, as the more experience one gets, the more one is convinced that our so-called "unscientific" ancestors were not quite so ignorant as is generally considered. I simply say that I personally can see no good in them, and I therefore do not recommend their use.

Animals.—Birds and animals are sometimes a source of trouble in gardens. *Cats*, for instance, have a way of using tree bark as a medium for sharpening their claws. They prefer such trees as Horse Chestnut, Lime and Ash, in which the bark does not get too hard, and in cases have been known to slice the bark to ribbons, exposing the wood below, with the result that decay set in. Large-mesh wire netting lightly wrapped round the tree at the base is the solution, as these animals must apparently have their hind legs on the ground when sharpening their claws.

Pigeons may be a considerable nuisance where they are found in large numbers, especially to town trees, as for example in London. Apart from the unsightly fouling of branches, the chief damage is due to the breaking of young branches and removal of young buds in spring, especially on Ash. In bad cases branches of common Ash have died off after a series of annual attacks. The weeping variety of Ash is most frequently damaged, the buds being removed year after year from the more or less horizontal branching at the apex of the crown, with the result that the tree presents a "bald-headed" and unsightly appearance during the summer. Light netting thrown over the upper part of the crown during the winter, preferably on a temporary framework, appears to be the only solution in places where the birds cannot be destroyed.

The Common Starling often causes great damage to young ornamental groves and clumps that are selected as roosting places. The birds come down in large numbers and settle on the young branches, often breaking them down with their combined weight. The soil is over-manured and consequently poisoned by their droppings, and the foliage is killed off. There is no certain means of removing these birds, as their mass reaction appears to differ, and one method will be successful where another will fail. Constant disturbance is the chief point. This, of course, must be done after sundown when the birds have come in to roost. Shooting is seldom successful. The burning of sulphur in buckets is a common practice, and special rockets can be obtained for firing into the trees.

Squirrels, especially the grey squirrel, which is nothing more than a tree rat, do far more damage in gardens than people think. They are extremely cunning and soon find out places where they are not likely to be hunted, and it is doubtful if the pleasing agility displayed by them balances the damage they do. They will peel the tops of

young trees and at times kill them outright. They bite off the leading shoots of conifers and destroy the cones. They steal vegetables and fruit, especially apples and peas, and where they are present in wild gardens the planting of bulbs is quite impossible, as they will dig them up almost as soon as they are planted. I know one famous garden where three plantings of bulbs were destroyed, and the fourth was saved only by spreading wire netting over the ground.

Shooting is the only satisfactory remedy, although a humane sleeve trap can also be obtained, and a charge of shot through the nests at breeding time will also save a lot of trouble in the long run.

Poisoning by Coal Gas.—In spite of the improvement in pipe construction, the poisoning of trees by coal gas occurs rather more often than is generally imagined. It is far more frequent amongst street trees than those in gardens, owing to the fact that pipe cracks are very often caused by heavy traffic, but garden trees on road edges can be affected just as easily as trees growing in the road outside. Besides actual pipe cracking, joints can be started by vibration—a fact that will be well realized by those who live in the vicinity of arterial roads.

Poisoning by coal gas is an old-standing trouble, as NEUMANN, writing in 1842, dealt with poisoning of Elms in Berlin in this way, whilst in Lille, in 1864, GIRARDIN was investigating the death by poisoning of Poplars. British literature on the subject is scanty, the chief contributions being those of PRIESTLEY working at Leeds, but in Germany and the United States considerable research appears to have been done.

That coal gas has a definitely toxic action on plant and tree growth is an accepted fact. From a laboratory point of view the exact reason is frequently difficult to ascertain with accuracy, as, apart from the fact that coal gas varies in composition according to the process of manufacture, the type of soil and the condition of the tree itself are to be taken into consideration. DEUBER, working at Yale, states that "the symptoms of gas poisoning in a tree are distinguished with difficulty from those resulting from other unfavourable conditions for growth. Conditions such as a hard packed soil and coverings which restrict aeration of the soil make the solution of the problem more difficult."

Other complications are due to the rate of gas flow from the leak, and the fact that in the majority of instances death is very slow, sometimes taking two or three years and producing a number of symptoms more or less identical with those connected with soil troubles of a more normal type. Fortunately the symptoms in acute attacks are reasonably easy to recognize, for they are characteristic. The first sign is the paling and early falling of the leaves, whilst single branches start to die off in the upper crown. As the attack progresses, more and more branches die, whilst in succeeding seasons the foliage gets thinner and unhealthy-looking. Cracks develop in the stem, from which a frothy liquid or slime flux flows which smells like stale beer

and is obviously full of fermenting substances. The bark of the trunk starts to fall off, or becomes so loose that it can be detached with the fingers, and if the wood beneath is examined it will be found to be tinged with blue and to possess a distinctly sour smell. It will in most cases be noticed that the damage beneath is much more pronounced on one side of the tree than on the other.

In one interesting case that came under notice, the progressive action was most pronounced. Four rows of Elms, about 30 feet apart, stood by a road in which a gas leak had occurred. In the first row the trees were all dead. The bark had fallen from the branches and was off in patches all over the trunks. In the second row the side nearest the road was dead with trunk bark beginning to fall; the other side was still alive, but the foliage was poor and branches were dead. In the third row the foliage was yellowish and unhealthy. In the row farthest away there was no sign of damage.

As regards the soil, the smell of gas is generally pronounced, and this test can be improved by making a hole with a crowbar, when the odour will be generally more pronounced. If a piece of gas pipe is put into the hole and the air inhaled, the taste is unmistakable; the application of a lighted match is not recommended for very obvious reasons. An examination of the roots and surrounding soil will generally result in useful information. Soil discoloration is very usual. Clay soil will have a blue tinge, and the wood of the affected roots will be coloured in the same way. In lighter soils of a dry type the colour is usually greyish. Rootlets and the root systems of young trees will be found to be blackened and brittle. The type of soil appears to have some effect on the rate of damage, as, whilst the gas spreads more quickly in light soils, the concentration in clay soils is greater, and the after effect in the soil itself seems more pronounced and its value as a growing medium is impaired for years.

I am informed by a most reliable authority that the Limes that grew in the Mall before the present Planes were planted were removed owing to the effect on them of a leaking gas main. Before the Planes were planted a deep strip of soil was removed and replaced with fresh soil from the country. Whilst most people attribute the unsatisfactory state of these trees to-day to drought, it is the opinion of my informant, one of the best-known forestry authorities in the country, that the roots of these trees have reached soil once affected and now infertile by the action of coal gas. These trees were planted a good many years ago, and it is possible that the gas of that time contained many more impurities than would be allowed to-day, so that such a situation could not again arise.

As regards the amount of coal gas required to kill a tree, there is no reliable information to be obtained, and the problem is almost impossible to solve. KNY, working in Germany sixty-five years ago, killed a twenty-year-old Maple in an experiment that took ten months and consumed 84,000 cubic feet of gas. The conclusions reached by investigation vary, but it is generally considered that

well-grown trees need a very large amount of gas to kill them, and that, except in advanced cases, immediate action often leads to recovery.

HARVEY and ROSE, working at Chicago University, and DEUBER at Yale, appear to agree on ethylene or some similar ingredient as being the chief toxic agent in poisoning by coal gas. Treatment consists of the removal and replacement of as much contaminated soil as possible, and heavy watering. Damaged roots should be cut back carefully, and the surface of the wound dressed with a mixture of creosote and tar in the proportions of 1 to 4. Trenches filled with compacted clay to cut off the influx of gas from saturated areas are stated to have been successful. F. W. PARKER, working in the London parks, has found that the application of large quantities of lime to affected soil has had beneficial results. Gas chemists, however, consider that whilst lime would probably neutralize hydrocyanic acid, which is sometimes found in coal gas, and which is considered extremely toxic to plant life, it is doubtful whether it has any action on the unsaturated carbons of which ethylene is an important member.

Sewage and Alkaline Poisoning.—Another problem of this type occasionally met with is the poisoning of trees by sewage from a faulty cesspool. Sewage in small doses will do a tree no harm, in fact often does it good, but when the roots have access to a comparatively large quantity its action is definitely toxic. The trouble usually arises in one of two ways—either by the liquid flowing out of a leak and saturating the ground, or by roots working through the wall of the cesspool. Of the two, the latter is perhaps the less dangerous, as then the effect on the root is to cause what might be described as local death fairly quickly, the result being merely a damaged end to the root in question. With liquid flowing from a leak and working through the soil close by, the whole root system is liable to become affected, the period depending on the size of the leak and the type of soil. In heavy, compact soil one side of the tree will generally show unmistakable signs. In a light soil the whole tree seems to “go off” at more or less the same time. “Overflows” may be the cause of trouble, as they are sometimes led into the roots of an adjacent tree with the mistaken idea that this “helps the liquid to get away quicker”—what it generally does is to kill the tree.

The symptoms of sewage poisoning resemble those of gas poisoning to some extent, especially as regards discoloration and early leaf fall. Another sign is a thick flush of leaves along the branches whilst the foliage on the twigs is very thin. The bark on the lower part of the trunk begins to crack and scale off, whilst the wood below will be found to be rather soft and dirty purple-brown with a most offensive smell.

Treatment consists of opening up the soil and tracing the leak. If made of brickwork, as much of the wall of the pit as possible

should be well concreted over. Damaged roots must be cut back and the exposed surfaces tarred. Saturated and contaminated soil should be removed as far as is possible and fresh soil put on. Heavy waterings will help to aerate the area and freshen it up.

An excessive supply of soapy water from wash-houses, laundries and bath "overflows" will often do trees more harm than good, owing to the amount of alkaline matter introduced into the soil. As regards trees in towns, one should discourage the step-washer who regularly every morning empties the contents of her bucket around a young tree—a kindly but misguided action which too frequently ends with the death of the recipient.

MASTERS LECTURES, 1936.

THE POTATO IN ITS EARLY HOME AND ITS INTRODUCTION INTO EUROPE (*cont. from p. 123*).

By REDCLIFFE N. SALAMAN, M.D., F.R.S.

THE evidence of the persistence of sacrificial rites in connexion with the potato at the time of the Spanish Conquest and later can be gathered from several sources.

VELASCO * says that neither the Kings of Quito, nor the Incas of Peru, nor the Spaniards were able to suppress the harvest festivals in southern Ecuador, where one hundred children annually were sacrificed. Potatoes in these parts were an important crop, and it is to be presumed that these ceremonies referred at least in part to them.

CIEZA DE LEON † gives a remarkable account of a scene observed by a priest in May 1547, and attested by him in CIEZA's presence. It relates how a great gathering of Indians took place at the call of the drum in Lampa in the Collao and how, after the chiefs—who wore their best clothes—had seated themselves on richly embroidered mantles, there entered a procession of gorgeously dressed young boys, each carrying a weapon in one hand and a bag of coca in the other, who were accompanied by a similar group of young girls in grand robes with long trains held up by older attendants, and how the girls carried bags of rich clothing and gold and silver. Then followed native labourers with plough on shoulder succeeded by six pages, each with a bag of potatoes. After a ceremonial parade, and the labourers, holding the bags of potatoes high above their heads had danced to the beating of drums, there was brought in a one-year-old llama, "all of one colour," and this was taken to the chief and then killed and its bowels withdrawn and given to the sorcerers. Then certain Indians collected all the blood they could from the llama and poured it on the potatoes in the bags. Unfortunately, at this critical moment an overzealous catechumen of only a few days' standing arrived on the scene and, having denounced them all, the gathering dispersed.

The original account of the ceremonial is well worth reading, and that it should have taken place seventeen years after the advent of the Spaniards, and near to the ancient capital of the empire, adds to its interest. But the great value of the narrative for us lies in the evidence it affords of the change from a human to an animal sacrifice, and the transference of the strengthening blood from the sacrificed animal direct to the seed potato.

* DE VELASCO. *Historia del Reyno de Quito*, vol. 11, p. 35.

† CIEZA, PEDRO DE LEON. *Travels of (1550)*. Transl. by C. Markham, Hakluyt Soc. 1864, p. 412.

It is difficult not to see in this elaborate ceremony, in which young boys and girls play so prominent a part, a reminder of the part which children destined for sacrifice had played in earlier times, and to whom the most elaborate homage was paid as they passed in procession to the scene of the sacred rite.

Father ARRIAGA * tells us that all useful plants are animated by a divine being who causes their growth. Such are called Zara-mama (maize mother), Coca-mama, and Axo-mama (potato mother). He then describes an elaborate ceremonial in which puppets of maize or coca [potato is not mentioned specifically] are made and dressed as women, and kept as a sacred object or "huaca" for the following year, and amidst much dancing, sacrifices were made to them. Especially large, or twin, or peculiarly coloured maize cobs, he says, have a certain religious value as fertility agents. "Another superstition they have with them they call Axo-mama: for when two potatoes were found growing together they kept them in order to get a good crop of potatoes."

Father ACOSTA,† who was in Peru from 1569 to 1585, describes the same type of rite in respect to maize and lays emphasis on the fact that the maize cob which was kept as a huaca was a particularly big one.

TSCHUDI,‡ writing about 1847, says: "On the day of San Antonio, the natives of Acobamba (east of Lima) made a great feast; all the men assembled in the Plaza were divided into two parties, and began fiercely to fight, until some of them fell down wounded or dead. Now the women rushed forth amongst the men, collecting the flowing blood and guarding it carefully. The object of the barbarian fighting was to obtain human blood, which was afterwards interred in the fields with a view to securing an abundant crop."

Recent evidence of sacrifice in relation to the potato has reached the writer from three different sources during the last fourteen years. Professor TELLO informed the writer how, when a group of natives were digging the potatoes, and one should find a blood-red deep-eyed tuber, or a twin or other unusually shaped one, then, if the finder were a man, he ran to the nearest woman, who ran away as fast as she could, till he caught her up and touched her gently with it; but if the finder were a woman, she ran up to the nearest man, who must stand his ground, and hit him as hard as she could on the face with the tuber. A very similar account of the same custom has been recently sent to the writer by Mrs. CLARENCE WOODS, the author of *High Spots on the Andes*, who adds that her native informant had no idea of what the custom meant.

There can indeed be little doubt that here we have a survival of the human sacrifice of former days. I am indebted to Mrs. WOODS for further information concerning ceremonies in relation to the

* ARRIAGA, *loc. cit.*

† DE ACOSTA, JOSEPH. *Natural and Moral History of the Indies* (1591). Trans. Hakluyt Soc., Bk. V., p. 374.

‡ TSCHUDI. *Travels in Peru*, vol. ii, p. 358 (1847).

potato. One of these would appear to be a variant version of the custom we have just described. It forms a feature of the first part of the harvest festival. The workers search for the biggest and most irregular tuber; when they have found one it is thrown at the owner of the farm, who, catching it, throws it as far as he can across the field. This procedure is thought to ensure that the whole of the field will in future produce similar large potatoes. The second part of the festival is given up to a religious service with dancing and drinking.

In May, in the high Sierra, a service is held in the potato fields in which a burnt offering is made, composed of leaves of "velacay," "hancuir," the raw fat of the llama, "huallpo," the raw fat of the vicuña, and alcohol, which is solemnly burnt while the owner prays that his potato crop may be productive. The ashes are then spread over the field, and dancing and drinking ensue. In August a similar ceremony takes place at the time of the cultivating of the potatoes; an altar is then set up in the field and mass said, followed by chicha-drinking and dancing.

In these latter ceremonies we see that a transference has taken place; instead of imparting fresh strength direct to the potato, its spirit is now given to the soil.

Mr. KENNETH GRUBB has told the writer how he has seen processions of natives going to the potato-planting in the highlands, carrying the image of some saint, Peter or Paul, but never one of the Virgin, who is not deemed a good fertility emblem; there is a great dancing and playing of flutes and pan-pipes, and the men are decked up with coloured garters with bells hanging from them.

The following ceremony, which Mr. GRUBB personally witnessed, is a good example of the rationalization which follows the clash of two conflicting cultures:

A native small owner was about to sow the first potato seed of the year; he took an old pointed digging-stick and made a hole in the ground, then, kneeling over the hole whilst he muttered a prayer, he put in it coca and potash, spat on the mixture and, placing the tuber on top, covered the hole. When he was asked why he did this, rather than open up a furrow with the one-handed ox-plough which he had on the farm, he explained that he had plenty of coca on the farm, there was no question of economy, but the plough (elementary in type as it was) was to him a symbol of the domination of the stranger, and he planted his first potato in this manner so as to preserve his free soul.

From these accounts it would seem evident:

- (A) That the object of these ceremonies was to fortify the innate spirit of the plant in order that it should exert its utmost activity—a fertility rite in the fullest sense.
- (B) That the nature of the spirit was regarded as that of a sexually mature female.

- (c) That aberrations from the normal, such as over-large maize cob or twin tubers, were regarded as being endowed with an extra gift of the spirit because they emphasized the type of reproductive activity desired.

It is interesting to note that there is no stress laid on the phallus as an emblem of fertility, as was so often the case in the Old World.

Before we leave the problem of sacrificial rites in relation to the potato, reference should be made to a group of anthropomorphic pots, some of which are relatively common in collections of Early Chimú pottery. In these pots human heads or whole figures, generally kneeling, are represented with nose and mouth mutilated in a manner similar to that already described, but in none of these is there any evidence of the potato. A further group of such figures display amputation of hands or feet, or both. The writer has collected a large series of photographs of these types of pots and feels reasonably confident that they represent a destructive ulcerative disease known as Uta or Espundia, a form of Leishmaniasis.

There is, however, a still further group of pots in which the victims display the same mutilation of mouth and nose associated with amputation of the legs below the knees and are portrayed lying prone on their abdomens. In some of these pots tumour-like swellings are seen on either side of the neck on which marks, suggestive of potato eyes, can sometimes be made out (fig. 43). Before reaching any conclusion as to the meaning of these particular pots, it is necessary to compare a larger collection of them than has as yet been available to the writer, but the suggestion that these particular neck swellings represent potato tubers seems not unreasonable, especially as sufferers from the Uta disease do not develop such swellings as a consequence of their illness. On the other hand it is to be remembered that somewhat similar protuberances, though neither so large nor so individual, are occasionally portrayed which are obviously intended to represent part of the coiffure. It is possible that in these pots we see a fusion of two different ideas, the one a protection against a devastating disease, the other an agricultural fertility rite, whose only real relationship is the similarity of their symbolism, *i.e.* the mutilation of nose and mouth.

The sacrificial rites, bound up with the cultivation of the potato, as recorded in the ancient Peruvian pottery, carry the history of our subject back to at least the second century of this era. The echoes still resounding in the folk lore and customs of the people to-day testify to the reality and strength of those ancient rites. But history does not begin with the chronicler; its roots go down to an age that is silent, not because man was asleep, but because it was for him the age of his great struggle with Nature in his new environment, a struggle in which he must win the first round of the combat, or perish. How long that combat lasted we may never know, but when it was over man had as his allies the manioc, the potato and the maize.



FIG 39—POT FROM NORTH COAST OF PERU
A.D. 200-300 Cream showing group of mutilated
faces and a jaguar's head and suggesting a potato

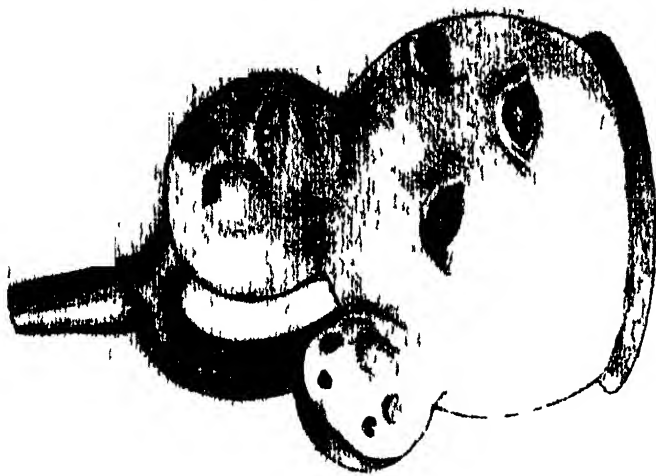


FIG 40 YELLOW ANTHEROID POT FROM
CHIMBOTL
Figure composed of potato tubers with pro-
nounced eyes Note the excised nose and
resected upper lip

(p. 120)

To face p. 156



FIG 41 —ANTHROPOID POT FROM MUCHIK AKKA

Cream and brown showing attendant carrying a corpse presumably a human sacrifice. A strange monster is shown on the body of the pot which represents potato tubers with deeply incised eyes

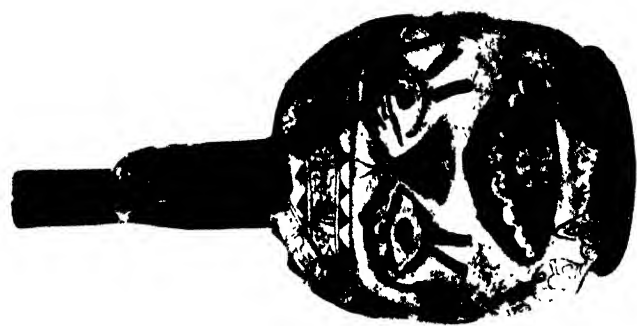


FIG. 42.—PROTO-CHIME ANTHROPOID POT FROM TRUJILLO. CREAM AND RED. FRONT AND BACK VIEWS.
 Showing extreme mutilation of nose and mouth. Back of head ornamented with potato eyes.
 (p. 120)



FIG. 43 — ANTHROPOID POT FROM MOCHF RED AND WHITE
 The swelling in the neck suggest potato tuber.
 (pp 121, 150)

[To face p 157.

Prone figure with amputated legs.

We have seen how the life of the pre-Columbian native of the highlands of Peru and Bolivia was largely conditioned by his cultivation of the potato; to-day in those parts where there are no mines or other intrusive European culture, the same holds good. Both BANDELIER* and McBRIDE,† who have independently made intensive studies of native life and customs in the Collao, confirm this, and at the same time point out how beneath the veneer of Christianity lies the primitive animism of the people. In order to understand the reason of this persistence, one must understand something of the social system which reigned before the advent of the Spaniard.

The Incas were an upland tribe living near the shores of Titicaca, who gradually asserted themselves over their neighbours, eventually establishing themselves in and around the town of Cuzco. In the course of a relatively few years, this small but dominant tribe launched out into a series of conquests radiating in all directions from Cuzco, and built up an empire which eventually reached from Quito in the north to the river Maule in the south, and from the Pacific coastline to the jungles of the Amazon basin.

The Inca regime acted as an integrating force over a period of some four hundred years, binding together a large number of states of very varying degrees of culture into an imperial federation.

At its head was an autocrat, the Inca, to whom was ascribed an almost divine nature. Not even a federal prince, much less a humble subject, could enter his presence except he bore a burden, symbolic in some cases, on his shoulders. To this day, no peasant, whatever his or her age, goes forth without some burden on the back—a memorial and a measure of the depth to which servility has cut its way into the unresilient and fatalistic spirit of the Indian.

Over each conquered and annexed province was a chief, usually one of the old reigning family. These and lesser chiefs, with the Inca blood royal, formed an aristocracy whose privileges were doubtless great as compared with those of the peasant but were, nevertheless, strictly limited by law.

The Inca autocracy from its inception inculcated an association amounting almost to an identification of themselves with the "Sun," the chief of the pantheon and the pivotal point of their religious system. The Sun, through his proxy of the priesthood, the chief of whom was always a near relation of the reigning Inca, had a lien on one-third of the produce of all the land.

A vast number of the female population were segregated at an early age in convents for the service of the Inca and the Sun. From these were selected the Inca's own harem, as well as those ladies he presented to members of his family and others. In addition to this service, they wove the rich garments of the court, great collections of which were maintained in the government storehouses.

* BANDELIER, *loc. cit.*

† McBRIDE, G. *The Agrarian Indian Communities of Highland Bolivia* (1921).

War and peace, the promulgation of laws, the control of public works, such as roads, temples, fortresses and the like, were all in the hands of the Inca. The executive was centralized in each province, which, in turn, was subject to supervision by higher imperial controllers from the capital.

An interesting custom, apparently invented by the Inca rulers, was that which provided that groups of natives called *Mitimaes*, taken from the more settled portion of the Empire, were removed into the newly acquired portions of the Empire. Like the planters in Ireland, they were intended to afford an element of loyalty and foci from which Inca law and custom should radiate. CIEZA was greatly impressed by this system and states how, by its means, barter of agricultural products was established, allowing the natives of the highland, who lived so largely on the potato, to obtain from their relations, who had been planted in the lower valleys, supplies of maize and coca in exchange.

The Peruvian had no system of writing, but had developed a remarkable method of recording statistical information by means of a system of knotted strings, called the *Quipu*. Whether the passion for statistics begat the *Quipu*, or vice versa, would be a problem of interest, but however that may be, by means of the *Quipu* the Inca converted his empire into a marvel of statistically ordered and controlled well-being, over which ruled a horde of statisticians. Law was brought to the people by judges, to whom no discretion of judgment was allowed, and who stood to lose their heads as readily as did the victims of their mechanical sentences, were they to deviate either from the path of statistical jurisprudence or, it is only fair to add, that of honesty. Punishment was prompt and severe, not to say brutal. BAUDIN* has drawn an interesting picture of the statistically run state, and has shown how closely its better aspects approximated, at least in intention, to the normal socialistic methods of an efficient modern government such as we enjoy to-day in England.

In such a system centralized control is brought into harmony with local and municipal independence. In the Inca Empire, however, the former was for ever growing at the expense of the latter, a fault which did much to bring about the collapse of the Empire.

The government of the Inca developed nearly a thousand years ago much of the social machinery which we are apt to think was created by Communist Russia, though in spirit it was more akin to Fascism.

Below the Inca class, all were equal ; there were no slaves in the ordinarily accepted sense of the word ; there was no money, no buying or selling, but controlled exchange and barter. All able-bodied people had to work, and adequate provision was made for the infirm and old. Marriages were controlled by the State ; there were no taxes, but every man paid by service so much of his time as was ordained on the lands of the Inca and the Sun.

* BAUDIN, L. C.R. d. l'Acad. d. Sciences et Morales et Politiques, p. 445 (1929).

There were no famines, so at least it was claimed, for in every district were built great statistically-controlled storehouses, and the excess of one district made good the deficiencies of another. Moreover, there were accurate statistics as to the number of the population, the size of their flocks, the acreage and output of their land.

The central authorities controlled the division of the land amongst the people, and it is to be presumed that under their control the vast system of terraces, the marvellously constructed irrigation canals, the recovered alluvial fields of the temperate valleys, and the system of roads from end to end of the empire, were developed.

If a war of conquest, or the suppression of revolt were on foot, all was prepared, we are told, to the last button; the storehouses were filled with the necessary clothes, weapons and dried foods: potato chuño, maize and charqui. Were not the Quipu records all filed at headquarters?

The picture of the Inca governmental system which I have attempted to sketch will be recognized as one of an autocracy of a fascist type which, like those of to-day, stole its fires from the communists. But the picture is not complete; the statistically and logically designed state which has been described was but an imposing façade on a primitive peasant communism which had existed since time immemorial and much of which exists to this day.

The people were grouped in small family communities, or "Ayllus," corporations which held the land in common and distributed it amongst their fellows in a manner not unlike the old English strip system. The subdivision of the land each year probably arose from the necessity of giving the poor soils of the Sierra and altiplano a long fallowing. It seems probable that the head of a family may have owned his own small house; otherwise there was no private ownership. It is not to be supposed that the Inca passion for statistical control left the Ayllu untouched. CIEZA tells us that the Huancas who lived in the west of Cuzco cultivated their valley as one piece, but afterwards Inca HUAYNA CAPAC marked out the land which was to belong to each lineage. It is probable that this illustrates a common tendency.

All the members cultivated the land in common, and if certain small portions, such as the gardens attached to the dwellings, were personally owned, the Ayllu made itself responsible for the cultivation of such as belonged to the aged and infirm. This system, with slight modification, persists to-day throughout all the highlands of Peru and Bolivia. The members of the Ayllu display an intense attachment to their land and have invariably offered the most desperate resistance to those who would dispossess them. The Ayllu has, however, shown itself capable of adaptation, and in many places to-day it conducts co-operative marketing business for the benefit of its members.

In any case, from pre-Inca days till now, the peasant members of the Ayllu have cultivated their land in common, and the very tools they use are, as we shall see, silent witnesses to the system.

When the shock of the Spanish invasion occurred, a handful of

men brought the statistically inspired governmental edifice to the ground, like a house of cards. In the matter of a score of years there was nothing left of the centralized government or its methods. Its granaries emptied, its treasure melted and borne away, in but a short time scarce anything of the monumental works it had constructed remained to bear witness of its great past. Wealth and glory, and the wisdom of the Quipu all vanished before the stranger. Every conceivable injustice was done to the obedient and industrious units of the once statistical state. A population of some ten millions was decimated. Yet amidst all this ruin the men of the Ayllu and its organization persisted, clinging with a tenacious fury to their poor semi-barren patches of land beneath the eternal snows. These silent patient sons of the soil had not defied Nature all through the centuries to be dispossessed by strange demented men who preferred molten ingots to the beautiful vessels which the Inca's skilled artificers had contrived, and who actually imagined that a small piece of gold was more to be desired than a handful of maize or a few potatoes when one was hungry. The men of the Ayllu and the newcomers were worlds apart then, and have ever remained so. If man's initial success in winning a footing on the inhospitable Andean highlands may be attributed to the potato, it is no less clear that to the culture of the potato he owes that stabilization in his development which has characterized him throughout history, for the potato, by reason of its supreme importance as a food-stuff, dictated in no small measure the rhythm of his life.

The outstanding features of pre-Columbian Peruvian agriculture, as we have seen, were irrigation, terracing, the artificial reclamation of lands, the use of the guano deposits of the coast, the planned cultivation by colonists of montana districts, all of which necessitated or were themselves the outcome of a centralization which the governmental system was particularly fitted to further. It is when we come down to the actual tillage of the soil that we find the old basic communistic organization still at work.

There was no plough in the modern sense in the pre-conquest days, and llamas were not used to help till the soil. Statements to the contrary have been made, but a re-examination of the data does not support them. The native labourer had as tools a species of wooden spade which was furnished with a counterweight at the handle (fig. 45), a sharp-pointed stick or dibbler, and stone knives for reaping; but his most efficient tool was the *tacla*, or foot-plough, which he uses in the traditional manner to this day (fig. 46). This instrument, made of the tough Quishuar wood of the highlands, is 5 or 6 feet long, and 2 inches in diameter; the last 9 inches are bent at a slight angle upwards and the end in the old days was pointed, hardened by fire or shod with copper. To-day an iron blade, 9 inches long and 3 inches wide is fitted. On the shaft above the angle are bound two handle-like projections: the lower is for the foot, the higher for the hand. The plough is driven deep into the soil by a thrust of the foot and the pressure of the hands. The long handle is then pressed downwards

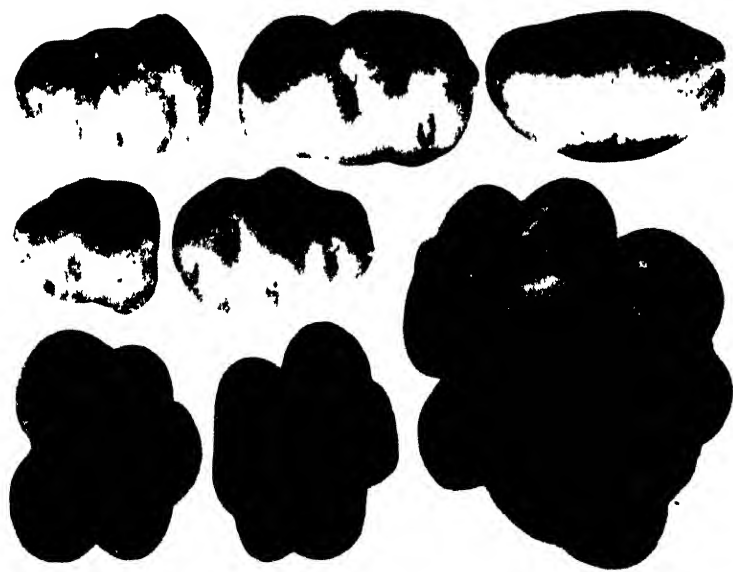
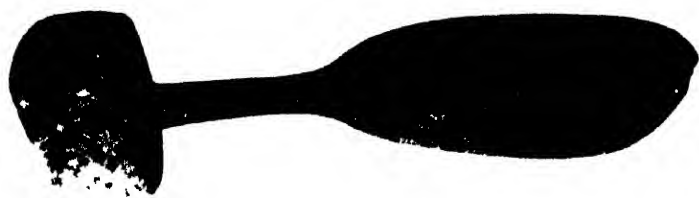


FIG. 44 —EXAMPLES OF CULTIVATED POTATOS FROM
PERU.
(p. 122)



G 45 —WOODEN SPADE
WITH COUNTERWEIGHT,
FROM A NAZCA TOMB.
[To face p 160.



FIG. 46.—THE TACILA, A STOUT STICK 5 OR 6 FEET LONG TO DAY SHOD WITH IRON.
A foot-rest is bound just above the spike and a handle higher up
p. 160

and, with a hand on the upper handle, the clod of earth is prised up. In actual practice the *tacla* is never used by one man working alone. It is essentially the working tool of a group. The description of its use by eye-witnesses as far apart in time as O. F. COOK * and GARCILASSO,† who wrote nearly three hundred years earlier, are the same. Groups of two to eight men work side by side, keeping time by the singing of a chant in which the word *Haylle* ("triumph") is repeated, pass down the field as they prise up the earth, women and boys in front of them turning the clod over on its back. This is probably the earliest example of tillage in which the sod is reversed and, it may be supposed, was devised to kill the coarse grass which covered the lands of the uplands heights in order to plant the potato. To-day when they wish to plant potatoes a couple of workers with their *taclas* turn up a single row in which the seed tubers are placed and at once covered with the sod; later, as they come up through the soil, they are "earthed up" by turning up with the *tacla* a row on either side.

To-day, the work of the field is shared by men and women, though the heavy work with the *tacla* is the man's job. But this does not appear to have been always the case. In the neighbourhood of Quito, CIEZA tells us, all the agricultural work was done by the women, whilst, to his disgust, the men were left to weave and sew. In central Peru the transference of field work to men had already taken place, as we know from GARCILASSO.

FRASER‡ points out that whilst in South America generally agriculture was the women's department, in Peru we see a transitional stage. The ancient custom of relegating the field work to women finds an explanation in some of the customs to which we have referred, in which the native regards the generative spirit of the plant as female. That in Peru this important step in social evolution had taken place at an early date is not to be wondered at in a people whose methods of plant selection and cultivation entitles them to high rank amongst the agriculturists of the world.

Chile shares with Peru in being the endemic home of the potato tuber, both in its wild and its cultivated state.

The Russian investigators found in that part of Chile which interests us, viz. from latitude 35° to 43°, two forms of potato with the chromosome formula $2n = 48$, which they deemed wild species. Besides these, they found a large number of cultivated varieties of the same formula, which were very like our own European potato. A wild potato with the chromosome formula $2n = 36$, which develops small tubers and is known as *S. Maglia*, is common on the coast, and was described by DARWIN when he visited Chile in the *Beagle*.

We have no pre-conquest data for the history of Chile south of the river Maule, latitude 35°, and very little for anything north of it. All

* COOK, O. F. "Foot Plow Agriculture in Peru," Ann. Rept. Smithsonian Inst., p. 487 (1918).

† GARCILASSO, *loc. cit.*

‡ FRASER, J. Golden Bough, enlarged ed., vol. vii, p. 120.

we know is that the potato was grown and eaten in the Andean regions of north Chile, and that it was cultivated on the eastern side of the Isle of Chiloe, where there are very fertile and well-watered lowlands, as well as on the opposite mainland. We know, further, that in Chiloe in the eighteenth century the natives grew some thirty varieties and raised heavy crops.

No archæological data bearing on our problem have been reported from Chile, and it is therefore not possible to say how far back the cultivation of the potato goes. It is interesting, however, to note that whilst the Chilean had a native name for the wild bitter-tubered plant, 'Maglia,' he borrowed the Peruvian word "Papas" for the cultivated sorts.

The Chilean tribes were never brought into the Inca system, and at the time of the Spanish incursion they were themselves in the process of evolving a series of more or less democratically controlled local tribal units in which, although there were appointed war chiefs, the individual retained a very considerable degree of independence. The Chilean had no special food problem to solve, such as had the peasant of Peru and Bolivia, and there is no reason to suppose that the potato played as important a part in his life and cultural development as it did in that of his northern neighbour.

(To be continued.)

GENTIANA DEPRESSA.

By C. T. MUSGRAVE, V.M.H.

A GOOD account of this plant and of its history has been given by Mr. HAY in the eighth volume of the *New Flora and Silva*, p. 133. He tells us that though it has been known to botanists for over a hundred years it was not until quite recently that it became known to gardeners through the introduction of seeds from Nepal in 1932. The plant was first described by DAVID DON in his *Prodomus Florae Nepalensis*, published in 1825, and dried specimens collected by WALLICH, probably in the first quarter of the nineteenth century, can be seen in the British Museum (Natural History) at South Kensington.

In quite recent times Mr. WILKIE has given us a detailed description of the plant and its flower in his book *Gentians*. But though plants have been raised from the Nepal seed and have flowered in both Scottish and English gardens, no account has, so far as is known, been given of the behaviour of the plant in cultivation in this country.

It seems strange, but it is none the less true, that there is some uncertainty as to the season of the year at which *Gentiana depressa* normally flowers in its own home in the mountains of the Himalaya. It certainly flowers in May because, as Mr. HAY points out, the dried specimens in the British Museum include a splendid sheet of flowers collected by Prof. SHARMA in Nepal in May 1932, at 13,000 feet. But there is also no doubt that it flowers in the autumn, as there are in the British Museum two other equally fine sheets of dried specimens of flowers collected by Prof. SHARMA in August and October 1932, at 16,000 feet and 15,500 feet respectively (see fig. 47).*

Gentians which flower normally in the spring do not as a rule flower again in the autumn, though *G. acaulis*, where it consents to flower at all, seldom fails to open a few flowers again in the autumn in addition to its normal spring flowering. But so far as my experience goes there is no Gentian which flowers in this country normally in the autumn and again, even to a limited extent, in the following spring.

Yet it seems almost probable that in the conditions of the climate existing in the Himalaya *G. depressa* flowers not only in the autumn but also in the spring. If the flower buds are not formed until late in the summer they may not all have a chance of opening in the autumn before, as Mr. HAY suggests, the snow comes, where those still in bud

* I am indebted to Mr. J. RAMSBOTTOM, Keeper of Botany in the Natural History Section of the British Museum at South Kensington, for a photograph of the sheet of dried specimens of flowers collected by Prof. K. N. SHARMA on August 8, 1932, from which this figure is reproduced.

may remain under their covering of snow until the winter is past, only to open at the call of spring.

In fact the season of flowering of this *Gentian* is probably largely dependent on whether the climatic conditions are favourable to the formation and maturing of the buds early enough in the summer to enable the flowers to open in the autumn. Should anything happen to prevent this autumn flowering, such as unsuitable weather for the formation of the buds in the summer, or an early fall of snow in the autumn, those buds which have not opened in the autumn may be carried through the winter under the snow in a state of suspended animation and open in the following spring.

The habit of forming flower buds in the summer and autumn for flowering in the following year is not uncommon in many flowering shrubs; but it must be very unusual that a high Alpine plant is able to carry its unopened buds through a winter and flower in the following spring.

It is not suggested that spring is the normal season in which *G. depressa* flowers, but in this plant provision has presumably been made that buds which would have opened in the autumn if they had the chance are still able to open and flower in the spring.

The experience gained in the last two years tends to show that the time when this *Gentian* will flower in this country is likely to be largely governed by the weather conditions of the summer. If the weather is hot and dry, as it was in 1935 up to the end of August, it is improbable that it will flower until October or even November. In that case the buds which are formed and do not open in the autumn may be carried through the winter and open when spring comes; but owing to the wetness of our winters it is doubtful if these spring flowers will come to perfection. In fact several buds were carried through the winter of 1935 in my garden and opened in April 1936, but the flowers were poor. If, on the other hand, the season is wet, as in 1936, the plant may flower in August and September (see fig. 48, reproduced from a photograph taken in the first week of September 1936).

At present, though *G. depressa* grows well and easily, it cannot be said that it flowers freely; that is to say, it is unusual to see a plant having as many as six flowers open at one and the same time, though every plant may carry an open flower or two over a very long period—from the end of July to the middle of November, given suitable weather conditions. The herbarium specimens give the impression that the plant in its own home in the mountains is not very free in flower, and this may be its habit.

In cultivation in the garden *G. depressa* has grown and flowered better in loam and leaf-mould in a sunny open position than in any other mixture of soil or position, and it requires all the moisture it can get. Temperature does not appear to affect its flowering; when the buds are ready to open they will open as well in the chill of a November day as in the heat of the August sun. The plant is a

vigorous grower, spreading quickly and forming a low cushion or mat—a foot across each way is not too much space to allow for it. When it starts into growth the plant sends out a number of shoots at right angles to the main stem; these shoots strike readily if pulled off the stem, or if covered with soil they will root and form layers; they form the flowering stems for the following year and are each presumably capable of carrying one flower sessile in the terminal leaves.

It is probable that a top dressing of loam, leaf-mould and grit in the spring will be of considerable benefit to the plant.

The leaves and general structure of the flower have been well described by Mr. WILKIE, but he hardly does justice to the flowers. When the flower opens the lobes of the corolla are not upright as shown in the herbarium specimens—they lie flat, showing an open flower an inch and a half across with a wide mouth. The colour of the lobes is a brilliant sky-blue; the plicæ may be a trifle lighter in colour and are occasionally tinged with pink. The outside of the corolla is green with broad white bands, and the throat is white or faintly tinged with green and marked with dark green spots.

Having regard to the ease with which it can be propagated, *G. depressa* should never be lost, and when it has become acclimatized it should take a foremost place among the ever-increasing number of autumn-flowering Gentians.

THE PRIMULA OR AURICULA ROOT APHIS.

A SIMPLE CURE.

By MRS. GWENDOLYN ANLEY, F.R.H.S.

FROM observations and inquiries made during the past four years in botanical, nursery and private gardens in many parts of England, France, Germany, and other European countries, as well as, more recently, in Japan, it is evident that the *Primula Root Aphis* is not only very widespread, but that it is generally considered a serious danger, inasmuch as it defies the usual means of pest destruction.

After experimenting for several years with many and varied insecticides the writer is now reasonably confident that so far as pot-grown Primulas are concerned, Paradichlorbenzene (hereafter for convenience to be called P.D.C.B.) may be accepted as a rapid, easy and safe means of destroying each successive attack by aphis. Not only is this method of treatment efficacious, but—an all-important point—all necessity for root disturbance is avoided.

Before describing the method of treatment certain essential facts concerning the Aphis must be given.

Primula Root Aphis (*Pentaphis auriculæ* Murray), as usually met with, is the full-grown, wingless, viviparous female. It is the colour of parchment, lacks cornicles, but is furnished with a number of wax glands. The winged female is rarely found, but Mrs. C. B. SAUNDERS reports the finding of several specimens recently. The characteristic white "wool" which is found about the "collar" or roots of an infested plant denotes the presence of a colony, and is never present where isolated insects only occur. This "wool" is excreted by the very beautiful white feathery wax glands with which the aphides are supplied. At first sight this can be very easily mistaken for an "alarming white mould or fungus" as REGINALD FARRER believed it to be, and which provoked him to the erroneous statement that "no *Primula* thrives for long in a pot."

In reality the "wool" is a waxy substance produced by the aphides as a protection against natural enemies in the soil. It also proves a very effective protection from human enemies, as it gives resistance to the usual insecticides. As with other aphides, it is necessary to reach the breathing pores of *Pentaphis auriculæ* to ensure destruction. So long as the "wool" exists it is impossible to wet the bodies of the insects. Therefore, if a spray fluid is employed, it must be a contact wash, i.e. an insecticide, containing a wax solvent. Methylated spirit and paraffin are the two most commonly used for the purpose. The method of application must be either,

- (a) by direct contact with the "collar" and roots of the plants, which (after shaking away all soil) are plunged to their

necks for a few minutes in a concentration of suitable strength ; or

- (b) by plunging the pot in a vessel containing the insecticide, and leaving it till the cessation of air bubbles indicates that the soil is completely saturated.

The first of these methods must, perforce, entail the repotting of the plants. All might be well had we but a single attack with which to contend. Unfortunately, it is the experience of most Primula growers that attack follows attack in rapid succession. What then ? It is clear we cannot subject our Primulas to such drastic root disturbance each time a fresh outbreak of the trouble becomes manifest. After two years' trial the following method of dealing with the plants and treating the recurrent attacks has been found to be entirely satisfactory.

The Primulas should be repotted as soon as possible after flowering. To ensure a clean bill of health, the roots should be shaken free of all soil and immersed up to the "collars" in a "Volck" bath, using one teaspoonful of "Volck" in a pint of water. Warm water will ensure thorough miscibility. This is a strong concentration, but 10 minutes immersion will not cause any damage to the plants. After immersion rinse the roots in clean warm water, pat gently between the folds of a soft cloth, dust with silver sand, and repot the plants, making a point of using perforated zinc "crops" over the drainage holes.

"Volck," being a white oil emulsion and containing paraffin, is capable of dissolving the "wool" and reaching the breathing pores of the aphides at one and the same time. The plants, therefore, can now be considered free of the pest.

When repotting infested plants, all the old soil and drainage material should be placed in a metal receptacle, with, if possible, a metal cover. The broken crystals and debris of the P.D.C.B. should be scattered over this soil, and it should be left closely covered for a week before consigning it to the compost heap. If this cannot be done, all soil and drainage material should be burned the same day. The pots should be thoroughly scalded in boiling water.

After repotting, the plants should be plunged in sand, ashes, or some other cool material. They should be kept in a shady place, and though an abundance of air is imperative, shelter from draughts and drying winds should be afforded. A week after repotting, the plants should be watered with a solution of potassium permanganate, using rather less than a level teaspoonful of the crystals to a gallon of rain water. Freedom from aphid and the stimulus given by the potassium permanganate will quickly promote vigorous growth.

It is the opinion of the writer that the "collar" is usually the first point of attack. Periodical examination of the "collar" and surface roots, therefore, should not be neglected.

Paradichlorobenzene is a white crystalline solid, a chlorine substitution product of benzene. It will vaporize under ordinary atmospheric conditions. This action can be hastened by raising the

temperature. The vapour is not a decomposition product of P.D.C.B. but actually the vaporized form of the compound itself. It is not yet definitely established whether P.D.C.B. is inimical to growth and general development. In view of this uncertainty, the following modified treatment is suggested for use during the summer, and until such time as the *Primulas* have completed their growth.

In the experiments made no risk has been taken during the period of growth by treating the roots; effort has been concentrated on keeping the "collars" free of the pest.

Method of treatment with Paradichlorobenzene for infestation on the "collar" of plants.

If the plants are plunged in a frame where overhead protection can be afforded in case of rain, treatment can be given *in situ*. Care must be taken, however, to lift the lights on 4-inch blocks whenever shelter is necessary during treatment, for reasons which will become apparent hereafter.

If the plants are plunged in the open without overhead cover, they should be removed to the alpine house or an airy shed as soon as infestation is manifest. As water clogs the minute interstices between the soil particles, it is expedient to withhold all water for a few days before treatment, thus rendering the soil thoroughly porous. When the soil is in a suitable condition, the "collars" of the infested plants should be closely ringed round with P.D.C.B., P. 5 grade being suitable for the purpose.

The vaporized chemical, being heavier than air, penetrates and permeates the soil, exerting its toxic effect on all animal life therein. Moreover, the vapour is inclined to hang over the position in which it is vaporized, and is not easily dispelled except by a free current of air, hence the necessity of maintaining a good circulation of air during treatment. After five or six hours the remaining crystals should be removed, and all evidence of the attack cleared away, otherwise the old "wool" round the "collars" may be mistaken for a fresh infestation at some future date.

It must be recognized that the treatment described will destroy only the immediate attack; it does not render the plants immune. A fresh infestation may occur within a few days; vigilance, therefore, cannot be relaxed. The treatment should be repeated whenever necessary, and should always be followed by a thorough soaking with potassium permanganate solution.

On no account should the plants be placed under cloches or bell-glasses during treatment. If this is done the foliage will be so severely damaged that recovery is unlikely (see fig. 49). Two plants of *Primula scapigera*, eighteen months old, were subjected to treatment ten months ago. "A" received treatment under a small bell-glass. After treatment the leaves were severely scorched, and, in due course, died. Very reluctantly, half a dozen small leaves were put forth. This effort appeared to exhaust the recuperative power of the plant. For the last four months it has steadily decreased in size, and the condition



PRESENTED BY HIS MAJESTY THE KING

FIG. 47 — *GENTIANA DEPRESSA*

Specimens in the British Museum (Nat. Hist.) collected by Prof. K. N. Sharma in Nepal at 16,000 feet, August 1932.

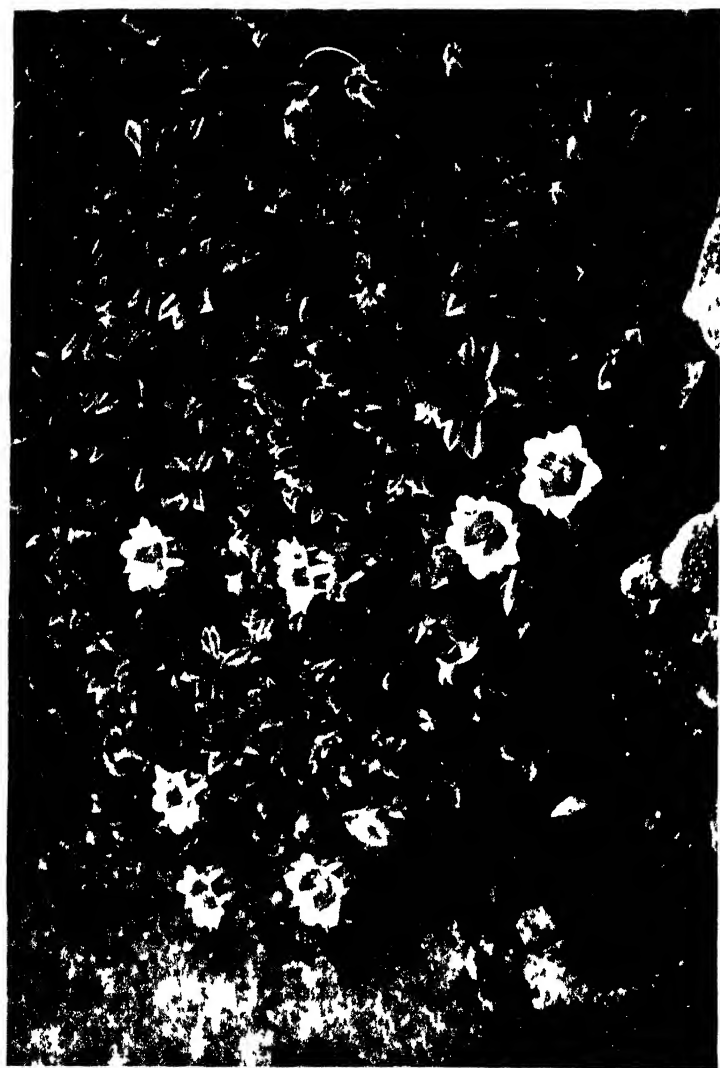


FIG. 48 GENTIANA DLPRESSA AT HASCOMBE, SEPT. 1936

gives rise to the conjecture that when absorbed through the foliage P.D.C.B. may prove to be a permanent poison to vegetable life. "B" received treatment, exposed to plenty of air in the alpine house, and is a remarkably healthy specimen.

By the end of September growth should be complete. No more potassium permanganate solution should be given henceforward, and water should be gradually reduced, as resting plants cannot utilize as much water as can those in full growth.

Symptoms indicative of Root infestation.

If any of the following signs have been observed in individual plants those plants should be regarded with suspicion, and treatment of the roots carried out forthwith.

(1) The most reliable symptom is the premature yellowing of a single leaf in an otherwise green and vigorous plant. By this a natural and seasonable yellowing of the lower leaves is not implied, but the unaccountable discoloration of a comparatively young leaf, often quite near the centre of the leaf rosette.

(2) Malformed, or attenuated (strap-like) formation of the leaves ; or leaves stiffly crumpled, as though attacked by red spider mite.

(3) Etiolation, streaking, or marbling of the foliage. This symptom is specially noticeable in the Auricula section of the genus.

(4) A general "standstill" in growth, when the resting buds remain indefinitely in a state of suspended animation (see fig. 50). In this case, death usually occurs, not by root aphides, but by minute worms which give the *coup de grâce* to the debilitated plants. Plants suffering from this prolonged invalidism can frequently be saved by treatment with P.D.C.B. to get rid of the aphides, followed by the cutting away of all diseased parts, and insertion of the healthy portions in the cutting-frame, where, in due course, new roots will develop, and the stationary leaf-buds show signs of active life.

Method of Treatment when the Roots are infested.

After growth is complete it will be necessary to ascertain whether the roots are infested. Examination for this purpose is desirable even when the "collars" are entirely free of aphides. This is done by turning out the contents of each pot, taking care not to break the ball of the soil or disturb the drainage material. If the roots are infested the trouble can be instantly detected by the "wool" which will be found tracing the course of the roots on the outside of the ball of soil. Having made this examination the plant should be carefully replaced in the pot, and the soil firmed. When the soil is sufficiently dry, P.D.C.B., P. 5 grade, should be scattered freely over the surface of the soil, taking care to extend it right out to the rim of the pots. It is not possible to be definite as to the quantity of the compound which should be used. The amount must be governed to a certain extent by the condition of the soil, whether light or heavy, moist or dry ; and on the bulk of the contents of the pots. Half a teacupful of the compound, disposed over the surface of a seven-inch "half

pot," or deep alpine pan, and left in place for three days should ensure a complete kill. At this period of the year, at all events, when the plants are inactive, P.D.C.B. appears to exert no ill effects, and the quantity used is immaterial. Whether a large quantity is used over a short period, or a smaller quantity over a long period, the result, as far as the eradication of the aphides is concerned, is the same, and the plants appear to be equally unaffected. The writer has frequently covered the entire surface of the soil with the compound, and left it undisturbed for five or six days with no ill effect on the plants. Throughout the experiments with P.D.C.B. no single plant has been killed, and the only one to sustain any damage has been the plant of *Primula scapigera*, "A" shown in fig. 49.

It is impossible to stress too much the importance of admitting air freely at all times during treatment, and especially during the autumn and winter when P.D.C.B. is being used in larger quantities. After treatment remove the chemical and give sufficient water to meet the requirements of the resting season. The plants can now be bedded down for winter in the following manner, after which they will require little attention beyond an occasional watering until the spring.

Immediately below each pot, whether plunged or not, place a small quantity of P.D.C.B. With small pots which are easily turned out, it may be preferred to place a few crystals amongst the drainage material. P.D.C.B. being insoluble in water, this method of using it cannot cause damage. With large show pans it is better not to risk disturbance of the drainage lest the entire ball of soil should fall apart. The use of perforated zinc "crops" as already suggested permits free percolation of the vapour through the soil if the P.D.C.B. is placed below.

This final step, which provides a mild but constant soil fumigation, ensures almost certain immunity throughout the winter. During 1935 the treatment as described was carried out in every particular on seventy pots of European and Asiatic Primulas. From October until the following May no examination was made of the plants, nor was any attention given them beyond watering when necessary, and ventilation of the frames. As the plants came into flower it became evident that they had received immense benefit from this prophylactic treatment, and it can be definitely stated that in no previous year had they given such a fine display as regards either size, quantity, or quality of the bloom. In May 1936 the seventy pots were examined and the results carefully noted with the following results :

66 pots were found to be entirely free of infestation.

4 pots were found to be very slightly infested.

The P.D.C.B. had entirely sublimated.

Six control plants, not given any P.D.C.B. below the pots in October, 1935, were examined in May, 1936, with the following results :

5 pots infested, 3 very heavily.

1 pot free of infestation.

After division and repotting the growth of the plants during the spring and summer of 1936 left nothing to be desired and at the time of writing (February, 1937) the plants are in first-class order and promise quite as good a show of blossom as last spring.

It therefore appears to be fairly conclusive that P.D.C.B., used as described, exerts no deleterious effect on the plants. Moreover, it is certain that where this compound is used, neither worms, leather-jackets, vine-weevil larvæ, ants, or any other soil pest will be found, either in the pots or in the plunging material. A small quantity of the crystals placed for two or three hours under the leaves of *Primula Winderi* and other low-growing plants subject to attack from red spider mite will rid the plants completely of the pest.

Provided it can be definitely established that growth is not checked by the use of P.D.C.B. it appears probable that in future we may be able to preserve our Primulas permanently from infestation by root aphid by the habitual use of P.D.C.B. underneath the pots throughout the year, renewing it from time to time when necessary.

The following general observations may be of interest :

Pot-grown Primulas in districts where the soil is cool and heavy are, as a general rule, less prone to attack than are those grown in places where the soil is shallow and sandy.

Plants plunged in sand, ashes, etc., are less subject to the pest than those standing on the surface of the ground, whether in a frame, or in the open.

Plants which are kept fairly moist, and which have their foliage lightly sprinkled every day resist attack better than those which are kept on the dry side.

Stone chippings used on the surface of the pots for the sake of appearance serve as direct encouragement to the aphides.

Perfectly healthy leaves springing from ground level are a source of danger and should be removed. It is not uncommon to find a solitary insect lurking in the butt of these lower leaves which touch, or almost touch, the soil. This has been found so frequently that the writer is inclined to the belief that this may be the focal point from which the attacks on the "collars" are most often launched. It would seem possible that the removal of all leaves which grow less than an inch above the surface of the soil may eliminate a potential source of infestation.

It is of vital importance to keep the "collars" of the plants completely free of all dead and dying leaves—that melancholy fringe which usually drapes the stems from late autumn till spring. The leaves should be removed by giving them a firm pull sideways, when they will crack off cleanly immediately below the new leaf-buds without causing any damage. The leaves must not be pulled downwards, as, by so doing, the young buds are quite likely to be torn off with the leaf. The leaves should not be cut off with scissors as is so often advocated. If this is done the cup-like butt remains, to afford, not a shelter only for the aphides, but a larder also, for they frequently damage the young buds whilst lying up in this dry retreat. The young

buds are perfectly hardy, and do not require what may be anomalously described as the dangerous protection of the old leaves.

In conclusion, would-be users are assured that P.D.C.B. is not unpleasant in smell, and is of low toxicity to man. If inhaled for any length of time at close quarters—a procedure which is quite unnecessary—a slight headache and dizziness may result, but these disappear immediately on reaching the fresh air.

Grateful acknowledgment is made to Mr. G. FOX WILSON, F.L.S., F.R.E.S., N.D.H., of Wisley, who has been good enough to read and emend the typescript of this article.



A. B.

FIG. 49. *PRIMULA SCAPIGERA* EIGHTEEN MONTHS OLD TREATED WITH PARADICHLOROBENZENE
A beneath bell glass B exposed to air



A.

B

FIG 50 *EPHOCIA MARGINATA* AFFLICTED WITH ARRESTED GROWTH FOR TWO YEARS
A untreated B two months after treatment with Parachlorbenzene



FIG. 51.—*ARUNDINARIA ANCEPS* IN MR CHARLES SCRAN DICKENS' GARDEN, COOLHURST, HORSHAM.



FIG. 52.—*ARUNDINARIA FASTUOSA* IN MR. CHARLES SCRASE DICKINS' GARDEN, COOLHURST, HORSHAM

PLANTS TO WHICH AWARDS HAVE BEEN MADE.

Abelophyllum distichum. A.M. February 23, 1937. From Lord Aberconway, Bodnant. A small deciduous Korean shrub related to Forsythia. The leaves are opposite, ovate or elliptic-ovate, up to 2 inches in length. The small white orange-centred flowers, which are carried in short racemes produced from the previous season's growths, are strongly perfumed.

Chrysanthemum 'Jean Brydie.' A.M. November 10, 1936. From Mr. T. Stevenson, Hillingdon. A rich yellow Single variety with several rows of florets, having a very slight cerise tinge at the margins giving a very pleasing warmth of colour to the flowers. The blooms are very regular in shape and measure $3\frac{1}{2}$ inches across. This variety was raised by Mr. J. A. Barrell, Bridgwater.

Chrysanthemum 'Red Dome.' A.M. November 10, 1936. From Mr. T. Stevenson, Hillingdon. A good fiery-red Decorative variety with an old gold reverse. The flowers are of excellent form and medium size. Raised by Mr. J. A. Barrell, Bridgwater.

Colchicum triphyllum. A.M. February 9, 1937. From E. K. Balls, Esq., Knebworth. A dainty species introduced from Morocco by the exhibitor. Each plant produces a cluster of three deep green, folded leaves, from which arise one or two slender-tubed, cup-shaped flowers, three inches high. The perianth-segments are pale rose-pink, marked externally with mauve, the stamens golden-yellow.

Coptis quinquefolia. A.M. February 9, 1937. From Major M. F. S. Jewell, Upton-on-Severn. A very pretty and uncommon Japanese plant well suited for pot cultivation in the alpine house. The small five-parted leaves form a neat bronze-tinted cushion from which the delicate white flowers, somewhat resembling tiny Anemones, are lifted singly on slender wiry stalks.

Cyclamen ibericum. A.M. February 23, 1937. From Mrs. Dyson Perrins, Malvern. A fine specimen of this pretty species was exhibited, bearing many dark green, mottled, heart-shaped leaves and numerous dainty carmine flowers. Each petal is blotched at the base with crimson.

Cymbidium \times 'Carlsbrook' var. 'Brilliance.' F.C.C. February 23, 1937. This is the result of crossing C. \times 'Ceres' with C. \times 'Ralph Sander.' It was exhibited by Messrs. J. & A. McBean, Cooksbridge. The distinctive character of the well-formed flowers is the rich reddish colour of all the segments, slightly less intense on the marginal areas.

Cymbidium \times 'Rhodo,' Exbury var. A.M. February 9, 1937. The spike bore seven flowers, which, although closely set on the spike, are of a pleasing cream colour, shaded with pink. The apical

lobe of the well-formed labellum is rich crimson. The result of crossing *C.* × 'Flamingo' with *C.* × *Pauwelsii*. Shown by Lionel de Rothschild, Esq., Exbury, Southampton.

Cypripedium × 'Cameo.' A.M. February 23, 1937. A handsome flower of comparatively large size, obtained by crossing 'Etta' and 'Nesta II.' The round dorsal sepal is white with blush shading, has a greenish base, and bears massive spotting of crimson-purple. The petals and labellum are brownish with a shining surface. Shown by Sir William Cooke, Bart., Hampstead Norris, Newbury, Berks.

Cypripedium × 'Lady Mona' var. 'Trident.' A.M. February 9, 1937. A distinct flower of large size and well proportioned. The dorsal sepal has a white apical area and a greenish base with a few dark spots. The petals and labellum are clear honey-yellow. The result of crossing *C.* × 'Grace Darling' with *C.* × 'Symphony.' Shown by Messrs. Black & Flory, Slough.

Erica canaliculata, Boscawen's var. A.M. February 9, 1937. From Lionel de Rothschild, Esq., Exbury. A very handsome shrub for the cool greenhouse. Commonly cultivated in gardens under the name *Erica melanthera*, the type produces waxy, pearl-white flowers in great profusion on delicate downy branchlets clothed with minute dark green leaves. The present variety differs in having pale rose-tinted blossoms.

Erica quadrangularis. A.M. February 23, 1937. From the Executors of the late Viscountess St. Cyres, Lymington. The long growths of this very beautiful Cape Heath are finely and repeatedly branched, and in the specimens exhibited each of the delicate branchlets was crowded with tiny, cup-shaped flowers of clear rose-pink.

Galanthus plicatus, Warham var. F.C.C. February 9, 1937. From Lady Beatrix Stanley, Market Harborough. This very fine form of the Crimean Snowdrop, which received the A.M. ten years ago, was found growing in a village garden in Norfolk by the Rev. C. Digby. It is a handsome plant with broad, spreading leaves and large, upstanding flowers.

Gladiolus viperatus. A.M. February 23, 1937. From T. T. Barnard, Esq., Wareham. From a basal tuft of narrow, glaucous leaves this species produces a tall, slender spike of about ten curiously-shaped flowers. The upper segment is narrow and arched, the two lateral ones broadly spatulate and spreading, while the three lower ones are directed downward in a fan. The rather sombre grey-green colouring is relieved by brown and yellow markings on the lower parts. The flowers are very sweetly scented, especially in the evening.

Jasminum dispersum. A.M. February 23, 1937. From A. E. Osmaston, Esq., Wisborough Green, Billingshurst. A very desirable evergreen climber for the cool greenhouse. The long, pendent shoots bear dark green, pinnate leaves and axillary and terminal panicles of medium-sized, exquisitely scented white flowers. In its natural habitat at 4000 to 6500 feet elevation in the Kumaon Himalaya it is a strong climber to a height of 20 feet.

Rhododendron 'Daphne' var. 'Elthne.' A.M. February 23, 1937. From E. J. P. Magor, Esq., St. Tudy, Cornwall. A brilliant hybrid raised by the exhibitor from the cross *R. nerviflorum* × *R. 'Red Admiral'*. It is a plant of compact growth with glossy, elliptical leaves 4 to 5 inches long and rather lax, ten-flowered clusters of deep crimson-scarlet flowers. A reverse cross from 'Daphne,' differing in flower and habit.

Rhododendron moupinense pink form. A.M. February 23, 1937. From Lord Aberconway, Bodnant. *Rhododendron moupinense* is a dwarf, evergreen shrub of sturdy, dense habit, suitable for the rock garden. The flowers are produced, usually in pairs, from the terminal buds of short, leafy growths, and are somewhat liable to be damaged by frost unless some protection can be provided. The flowers of the pink form are prettily suffused with rose-pink and freely spotted internally with crimson.

Saxifraga × Sündermannii var. purpurea. A.M. February 23, 1937. From Messrs. Ingwersen, East Grinstead. The parentage of this hybrid, which was raised in Bavaria by Sündermann, is stated to be *Saxifraga Burseriana minor* × *S. Stribnyi*. It forms a flat cushion of small rosettes of grey, pointed leaves. The pale pink, almost sessile flowers are very freely borne.

Scilla Tubergeniana. A.M. February 9, 1937. From Messrs. C. G. van Tubergen, Haarlem, Holland. This desirable new Scilla from Northern Persia is vigorous and free-flowering. The specimens shown had several scapes each bearing up to eight or more flowers. The fully-expanded perianth measures nearly 1½ inch in diameter, and is striped externally with blue on a ground-colour of pastel mauve.

Vuykstekeara × 'Rajah' var. 'Eclipse.' F.C.C. February 23, 1937. By crossing *Odontoda* × 'Sapphire' and *Vuykstekeara* × 'Leda' a pleasing addition to this section of cool-growing Orchids has been obtained. The spike bore seven crimson flowers shaded with rose-red. Shown by Messrs. Charlesworth, Haywards Heath.

BOOK REVIEWS.

"The Gardener's Companion." By Miles Hadfield, E. A. Bunyard, Jason Hill, R. N. Giffard Woolley and Eric Fitch Daglish. Edited and illustrated by Miles Hadfield. (Dent, London, 1936.) 7s. 6d.

An egg is proverbially full of meat, and this octavo volume of 640 pages is so fully packed with reliable botanical and horticultural wisdom that no one who can read English and afford the cost of a dog licence has any excuse for ignorance as regards garden lore—ancient and modern.

Mr. Fitch Daglish's chapter, entitled "The Gardener's Botany," is written in such plain language that the reader is led along an easy path of interesting facts instead of through a kind of obstacle race full of pitfalls and hindrances in the shape of long words and technical terms.

The Editor, Mr. Miles Hadfield, continues to construct this almost royal road to knowledge with a series of 22 plates containing a great number of excellent line drawings illustrating the parts of plants. The chief forms of roots, stems, leaves, flowers and fruits can thus be stored in the mind and the correct terms for each easily learnt from the descriptions beneath them. Plate 22, showing the structure and method of reproduction in ferns, is a good example of their high standard and of their botanical value. His artistic skill in illustration is seen in the full-page drawings of flowers, especially in those of *Lilium pyrenaicum* and *Senecio chiorum*, as well as in the quaint head-pieces. That of houseleeks on p. 143 is delightful in its composition and so accurately drawn that not only is the name on the label legible but its correctness is assured by the rendering of the dark leaf tips. His chapter on how plants are named should be read, if not learnt by heart, by everyone who wishes to talk about plants. The dictionary of specific names should prove an invaluable aid to remembrance, for once the reason for a specific name is grasped half the difficulty of recalling it has vanished.

There is so little in the book to criticize or question that it is almost a relief to point out that Valdensis is not, like Baldensis, "of Monte Baldo in Italy." It refers to the Valdensian Valleys, once famous for the cruel persecution of the Vaudois Protestants, which is immortalized in Milton's sublime sonnet XVIII. Milton's "Alpine Mountains cold" are, as Farrer has written, "more famous now for their Saxifrage than for their faith."

The derivation given for *Bulbocodium* is incorrect, though older than Clusius's day, for he copied it from a faulty Greek text of Theophrastus, whose accepted words are "*τό τοῦ βολβοῦ κάδυνον*," the head (not wool) of *Muscari*; the two last words were rolled into one by a careless copyist and a nonsense-word not found in Greek was coined.* At any rate the great Linnaeus fell into the trap also.

We are further indebted to the Editor for the altogether delightful and cleverly classified contents of the Gardener's Anthology, which occupy 103 pages and alone would be a good return for the price of the entire book.

The Week-end Calendar is another big slice of this rich cake and full of plums in the shape of good advice arranged under the headings—General, Vegetables, Fruit, Flower Garden and Under Glass. If a quarter of Mr. Giffard Woolley's excellent instructions are made use of, each week-end will be a busy one indeed and had better be reckoned as beginning on Monday at sunrise and finished an hour after sunset on Saturday, and the result would be a garden worth travelling far to visit.

"The Fauna of the Garden" is Mr. Daglish's second contribution, and as good as the first, especially in the portion dealing with friends and foes. His Group I of birds, and the Blackbird and Starling of his Group II, according to some tastes might well be included under the foes, but are charitably accredited with possible seasonal and local innocuous habits.

Jason Hill's masterly and sparkling review of the changing fashions in gardening should encourage garden owners to do what they like with their own regardless of the supposedly correct taste of the day—that would result in a refreshing individuality and purpose in some gardens.

Mr. Bunyard's "Gardening for Epicures" positively makes our mouths water and wish that the cook and he who sits at the head of the table possessed

* For a further explanation, see Bowles's Handbook of Narcissus, p. 13.

some fuller control, perhaps backed by legal enactments, to ensure that the kitchen garden offered its oblations into their hands while still young and tender instead of large and tough enough to travel round the country shows as prize winners. His witty sentences invite quotation, but would require too much time and space to weigh up the merits and extract the best among such sparkling gems. Opening the book at random and selecting from one page results in Strawberries: "the very primrose of fruits, announcing the season has opened once again, sounding the death knell to oranges and bananas. . . . The best-flavoured varieties have, sad to say, gone into a decline. 'Virus,' says the physiologist; 'Phytoptus,' retorts the entomologist; 'Humus,' says the gardener. Petrol has ousted the horse and the strawberry has suffered."

The Editor gives us three more contributions in "Plants and Periods," an instructive survey of the probable dates of introduction and countries of origin of many popular plants. There follows an extensive, usefully classified Gardener's Bibliography which will tempt many a gardener to pretend that an old hat and coat are good enough and so comfortable that they must do for another year that the value of their replacement may pass into the bookseller's hands.

Finally, before the excellent index and charming end-paper plan of Redleaf Garden, there is a list of Gardeners' Societies. Surely the egg mentioned above is, as exemplified in this book, double-yolked and has an attractive shell in its yellow dust cover with a diaper pattern of white outlines of flowers, and a little black snail looking over the edge of a black leaf for the details in the sentence behind its back.

"Die Kirschensorten der Deutschen Schweiz." (The Cherries of German Switzerland.) 4to. 256 pages. By Dr. Fritz Kobel. (Bern, 1937.)

All visitors to Switzerland have observed that among fruit trees the Cherry predominates, and from the small wild fruits growing high up the mountains from which such excellent jam and Kirschwasser are made to the large fruits of the lower valleys a great range of varieties are represented. How numerous they are is revealed by the important work before us in which some two hundred and sixty-four distinct varieties are described, and it will be noted that these are from German-speaking Switzerland alone. The Cherries of the Suisse Romande still await their monographer.

The geographical situation of Switzerland has made it a centre of immigration for varieties from Italy, Germany and France, and though there are many from these countries, we learn from Dr. Kobel that the bulk are of native origin. As in our own orchards, synonyms and local names are numerous and the task of sorting these out must have been prodigious.

Each variety is very fully described as to fruit and stone, probably at greater length than any previous work on Cherries. It is, however, unfortunate that the flowers and leaves are not described, nor the character of tree habit, which often so usefully assists identification. The season of flowering is noted and in many cases the fertility or identity recorded, with the desirable pollinators. The illustrations number eighty-four and are photographs of each fruit from four points of view and also of the stones, and are as good as possible.

The full value of such an important work as this can only be revealed by long study and use, but it is obvious at a first glance that it must be included in every pomologist's library, and it may, we hope, stimulate some English student to undertake a similar enterprise.

E. A. BUNYARD.

"Culture of the Chrysanthemum." By Keith Luxford. 96 pp., with 7 coloured illustrations and 17 half-tone photographs. (Keith Luxford & Co., Sawbridgeworth, Herts.) 2s. 6d.

This latest work on the cultivation of the Chrysanthemum deals clearly and concisely with the subject, but it has little to tell that is not already known. The statement that the majority of gardeners take all the cuttings they require in November and destroy the old plants surely must be a mistake and is at variance with instructions given later, in which the writer remarks that cuttings of Japanese varieties should be inserted during December and January! It is also remarked that, "where stocks are old and look like dying out, it will be found wisest to take all cuttings early, as these often die suddenly with the death of the plant." In such circumstances would it not be better to shake out the plants from their pots, reduce the ball of soil and roots and embed them in fresh soil placed on the greenhouse bench? In this way such plants would be induced to develop fresh, healthy growths. We are somewhat perplexed with the information given under the heading of "Disbudding and Stopping," respecting

first and second crown buds, and note that nothing is said in regard to terminal buds. When referring to the development of natural second crown buds the writer says that "the growth will develop at its end a *cluster of buds*," and that "the centre bud is termed the natural second crown bud." Obviously this is a mistake, as all crown buds are developed in similar fashion. Therefore, if the lateral growth surrounding the first crown bud is removed when this bud is retained, the same rule should be observed when the second crown bud is to be retained. Crown buds do not develop in clusters. Terminal buds develop in clusters and the largest and most promising bud of the cluster is usually retained; all the other buds in the cluster are removed. Exception must be taken to describing incurved varieties as "Incurves" and Pompon varieties as "Pompoms"; Incurved and Pompon are correct names for the respective types of the *Chrysanthemum*. Apart from these few imperfections the book is an excellent treatise of the subject; it is dealt with in such a way that the simplest should understand it. Japanese, Incurved and Decorative sections are each dealt with in turn. Singles and Early-flowering types are also fully considered, and the once-popular "Spidery" type is not forgotten; it is the only book, we believe, that has considered the "Cascade" varieties and their cultivation.

"A Practical Course in Agricultural Chemistry." By F. Knowles, F.I.C., and J. E. Watkin, B.Sc., Ph.D., A.I.C., with a Foreword by Sir John Russell, D.Sc., F.R.S. 188 pp., 21 figures. (Macmillan, London, 1937.) 10s.

According to the authors the book has been written to meet the requirements of students preparing for first degrees in Agriculture, Horticulture, Dairying and similar subjects. The authors' experience with their own pupils has convinced them that the students require a new book in which is gathered information at present scattered in scientific journals, specialized books, and other publications. Their book thus replaces the usual typed sheets of instructions for laboratory work familiar to many teachers. A limited knowledge of elementary chemistry is assumed.

The early chapters deal with soils and fertilizers, and with plant and animal chemistry, and include instructions for making simple laboratory tests for the various plant nutrients. These chapters can well be carefully studied by horticultural students, and used as a guide in the laboratory. Of the remaining chapters only that dealing with insecticides and fungicides will make a direct appeal to horticulturists.

The price of the book is rather high for its size.

M. A. H. TINKER.

"Aquariums and Fish Ponds." By A. L. Wells. 8vo. 64 pp. (Warne, London, 1936.) 1s. 6d.

A little book giving directions on the planting and care of small ponds and aquaria, with notes on the feeding and treatment of small fish.

"Flower Garden Primer or Gardening without Tears." By Julia H. Cummings. 8vo. xi + 338 pp. (Macmillan, New York, 1936.) 12s. 6d.

A book for beginners, dealing solely with flower-growing (including shrubs and hedges) in the open garden. The advice given is sound and the directions clear. The choice of plants would generally suit an English garden, although the book is written for America. A good many of the "English" names will be unfamiliar on this side of the Atlantic—we usually understand something quite different from *Dictamnus* when 'Gas Plant' is mentioned; 'Hooper's Sneezeweed' is scarcely less difficult to remember than *Helenium Hoopesii*; we grow the 'Showy Fleabane' here without knowing it, and the 'Moonpenny Daisy' and the 'Fall Daffodil' are quite well known under their proper names here, and there are "quite a few" other un-English names. This is a very minor criticism of a very useful book—but we do really think that any one who took the trouble to learn that a plant should be called the 'Scarious Blazing Star' would find it no greater task to learn it is universally known as *Liatris scariosa*, and he would not confuse it with the 'Blazing Star' so commonly called *Montbretia*.

"Nature's Remedies: a Popular Treatise on the Chemistry of Herbs, their Curative Powers; use in Cosmetics; Culinary Preparations; Wine and Liqueurs, etc." By J. W. Bell. 8vo. vii + 71 pp. (Pitman, London, 1936.) 2s.

About fifty of the better-known medicinal herbs are mentioned and several of them figured, with a note on the parts used, the season at which they should be collected, the complaints they are believed to alleviate, and the nature of their action. There are also several recipes for the making of remedies and some for toilet requisites and cosmetics.

NOTES AND ABSTRACTS.

Clematis × **Boweri** Spingarn (*Nat. Hort. Mag.*, xv, no. 4, 261; Oct. 1936).—A natural hybrid between *C. Davidiana* and *C. virginiana* found in the garden of Mrs. S. M. Bower, Waukegan, Illinois, where the two parents were growing. A vigorous climber with variable foliage; the flowers borne in small panicles—"somewhat similar to those of *C. Davidiana* but of pale lavender colour, and bloom for two weeks or so about the middle of August." Some branches bear male, others female flowers. No detailed description of the hybrid's distinctive characters is given.—*B. O. M.*

Colours of Flowers. By John Percival (*Gard. Chron.*, Feb. 1936. Pp. 74-6, with 6 figures).—The writer describes two groups of colours.

(1) Yellow tints; (2) anthocyanin colours shading from blue to crimson, scarlet and salmon.

(1) Yellow can be divided into (a) those with colour dissolved in the cell sap of which *Crocus*, *Iceland Poppy*, *Yellow Dahlias*, etc., are examples, and (b) cells containing yellow plastids (chromoplasts) containing insoluble yellow pigment, as in *Wallflower*, *Dandelion*, *Gorse*, *Narcissus* and others.

(2) Anthocyanin colours are due to coloured cell sap of epidermal or sub-epidermal cells.

Though a few genera, as *Anemone*, have wide range of colour among species, in the majority of genera the species range of colour is very limited.

The writer's observations during thirty years show that any single species when growing in a wild state varies but little as to colour, but soon produces variation under cultivation.

Within a single uncrossed species definite sequences are noticeable.

A. Anthocyanin colours :

Sequence I. Blue } to white as the first variation.
Mauve }

Sequence II. Blue } to white, pink,
Mauve }

pink being the result of crossing this original type with its white variety.

Sequence III. Blue } to white, pink rose, carmine crimson,
Mauve }

only found among plants under cultivation.

Sequence IV. Blue } to white as above, and on to scarlet, apricot or
Mauve } salmon,

as seen in *Sweet Pea*, *Cyclamen*, *Lupinus polyphyllus*.

B. Yellow.

Mutations of yellow flowers are rare, seldom going farther than white.

Fewer yellow species of *Crocus* produce white varieties than do the purple species.

No wide range of colour variation is observed among descendants of a single species which has not first produced a white variety.—*E. A. B.*

Colours of Flowers. By W. J. C. Lawrence (*Gard. Chron.*, April 4, 1936; p. 216).—A valuable exposition of the physical and chemical nature of coloration in cells of flowers, so concise that it is inadvisable to shorten it further as an abstract. All interested in colours of flowers should carefully study this well-classified account of the combination, interactions, and chemical changes of the anthoxanthins and anthocyanins dissolved in the cell sap and the insoluble plastids to whose presence or absence, oxidization or acidity all flower colours owe their origin.—*E. A. B.*

Coreopsis : Revision of the Genus. By E. E. Sherff (*Field Mus. Bot. Ser.*, xi, pp. 279-475; Oct. 1936).—A study based on material from the leading herbaria of Europe and America. The genus, founded by Linnaeus on *C. lanceolata*, is here grouped into eleven sections, whose area of distribution extends from South America through Mexico, Haiti and California to Canada, the central, southern and eastern parts of the United States, into Africa, where about forty species are found, but in Asia only as an escape or becoming naturalized in China (*C. lanceolata* and *C. tinctoria*). The subgenera *Calliopsis* and *Leptosyne*, amongst others, are included in one or more of these sections.

A key to 114 species and further varieties is given, but as this is divided primarily on the basis of geographical distribution, it will not always be of use to those who seek a correct name without knowing the origin of the plant.

One new species, *C. Woytkowskii*, from Peru, is described, while three of East African origin are illustrated by line drawings; these are *C. Jacksonii* S. Moore, *C. oblonga* Sherff, and *C. ochracea* O. Hoffm. Amongst the names reduced to synonymy occur *C. longipes* Hook. in *Bot. Mag.*, t. 3586 (= *C. grandiflora* Hogg ex Sweet var. *longipes* (Hook.) Torr. and Gray); *C. diversifolia* Hook., *Bot. Mag.*, t. 3474, and *C. Drummondii* (D. Don.) Torr. and Gray, both of which become *C. basalis* (Dietr.) Blake.—*B.O.M.*

Potatos, S. American, and their breeding value. (*Imp. Bur. Pl. Genetics, Cambridge, 1936*).—A summary of numerous reports on the three recent Russian explorations in S. America in search of tuberous species of *Solanum*, the behaviour of the plants in cultivation, and their possible value in crossing with European varieties. Several new species are mentioned and grouped according to their morphological, cytological, and physiological characteristics. It is concluded that European potatoes have been derived mainly, if not entirely, from those obtained by Drake in 1578 from the Chonos Archipelago, and by Cavendish, also from Chile, in 1587. These were grown in Ireland, where they flourished, and distributed widely over Europe subsequently. The potato had been introduced earlier by the Spaniards and from this source Clusius indirectly obtained two tubers and these were the origin of the early continental race, which apparently spread no further than botanic gardens and the orangeries, etc., of the very wealthy. The new discoveries will introduce fresh characters into existing European races and may enable the cultivation of this plant to be extended both into colder and into tropical regions, for some of the new species show great resistance to low-temperatures and many, indeed most, from the regions of Bolivia, etc., are short-day plants likely to thrive in the short-day tropics and therefore useful for India and similar countries, provided an acceptable tuber-quality and good cropping can be secured. In addition some appear to be resistant to the attacks of blight (*Phytophthora infestans*) and some to the known virus diseases. It is thus possible that these characters may be introduced into the European races and possibly combined with the qualities that have rendered them so valuable to the whole of the temperate regions of the world.

Very great efforts are being made by the Russian experimenters to obtain combinations of all the characters now available in order to see how far new varieties suited to all the varying conditions of climate, predilection, and purpose, can be obtained.

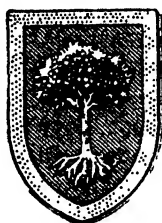
The summary is a clear statement of the work being done and the aspirations of the workers as set out in the papers summarized, which being for the most part originally written in Russian are not readily available to the great part of the world outside Russia.—*F. J. C.*

Scrophulariaceae of Eastern Temperate North America. By F. W. Pennell. (*Academy Nat. Sci. Philadelphia, Monographs*, vol. i., pp. 650; illus.; 1935).—This is a detailed monographic survey of the Scrophulariaceae native or naturalized in eastern North America, from Mexico northward to the St. Lawrence region and the Atlantic Ocean westward to the eastern base of the Rocky Mountains. It gives keys to genera, species and their variants, discusses their affinities, peculiarities and evolutionary trends and details their distribution, ecology and nomenclatural history. Considerable attention is paid to methods of pollination. The author himself has gathered over 1,500 specimens in the field during his twenty-five years' study of the group and over 40,000 herbarium sheets including almost all the extant types have been studied. Of the 50 genera recognized the majority consist of few species; the more important are *Pensilemon* (39 sp.), *Veronica* (20 sp.), *Gerardia* (35 sp.) and *Castilleja* (14 sp.). *Veronica virginica* is separated from *Veronica* under the name *Veronicastrum virginicum*, while *Cymbalaria* (typified by *Linaria Cymbalaria*), *Kichxia* (typified by *Antirrhinum spurium*) and *Chaenorhynchum* (typified by *Antirrhinum minus*) are considered genera distinct from *Linaria* and *Antirrhinum*. A useful feature is a list of collectors with their complete names and dates.—*W. T. S.*

Trees and Shrubs in Glamorgan. By H. A. Hyde (*Glamorgan County Hist. I.* Pp. 217-231; figs.; 1936).—An annotated list of the more notable trees and shrubs in gardens in Glamorgan, giving measurements of the largest. *Abies alba* at Aberpergwm House, 145 feet in height, *Juniperus virginiana* at Cefn Mably, 82 feet high; *Magnolia parviflora* 78 feet through at Dyffryn, and the Bay (*Laurus nobilis*) 72 feet through and 70 feet 6 inches high at Margam Palace, are particularly large specimens of their kinds.—*F. J. C.*

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COOL GREENHOUSE PLANTS.

By J. COURTTS, V.M.H.

[Read February 9, 1937 ; Mr. L. NOËL SUTTON in the Chair.]

GENERALLY any glasshouse devoted to the cultivation of plants may be regarded as a greenhouse in the horticultural world. Greenhouses, however, are divided into several categories—the cold or unheated house, the cool, and the warm greenhouse. The last is usually known as the intermediate house. There is also the stove or tropical house, where a temperature of 60° F. or over can be maintained.

A greenhouse may vary in size from a small, unpretentious structure, such as is known as the amateur's greenhouse, through varying sizes to its maximum, often called a conservatory or winter garden, which may be regarded as a show house in which a continuous display is maintained from a group of propagating and growing houses.

As I have—on this occasion—to deal with the cool greenhouse, it will be well to define what is generally meant by a cool greenhouse. Broadly speaking, the term may be applied to any glasshouse that is provided with a heating apparatus to exclude frost and in which a minimum temperature of 40° F. can be maintained. The temperature may, on occasion, drop below this without much harm resulting, provided the atmosphere and plants are kept on the dry side. It is desirable to keep a maximum temperature of 45° to 50° F. by fire heat ; it may, however, be allowed to rise above this with sun heat without harmful results. Here I wish to emphasize the fact that in reason a low temperature is much less likely to result in injury to the plants than a temperature that is too high. Almost needless to say, the house should be provided with adequate means of affording

ventilation and suitable benches or stages for accommodation of the plants. It is also very important that the house should be kept in a perfect state of repair and cleanliness; no rubbish should be allowed to accumulate underneath the benches, for rubbish is a fertile source of trouble by fostering insect pests and fungus diseases.

A potting shed is an important adjunct to any greenhouse, and it should include in its furnishing a pot rack, bins or suitable receptacles for loam, sand, etc.—in short, it should be so fitted that all tools and materials are in the proper places and readily accessible at all times.

Just as the cool greenhouse may vary much in size and shape, so it may also vary immensely in the class of plants cultivated in it. Some owners, according to fancy, may specialize in one class of plant, such as Cacti and succulents, the cultivation of which is increasing in favour; others may devote their attention to cool house species and varieties of Orchids, or again Carnations may claim their attention, but usually most greenhouse owners will prefer to maintain a bright and varied display throughout the year, and for such there is ample material to suit all tastes and pockets.

Cultivation.—While the cultural methods and details must be varied to suit the individual needs of the various plants that are grown, the requirements of most of them are quite simple, no elaborate composts being necessary. The average greenhouse plant is perfectly happy in a compost consisting of three parts good loam to one of well-decayed leaf soil or brown fibrous peat, with enough clean sand to keep the whole open and porous. The amount of sand and leaf soil used will vary according to the class of loam used. To each bushel of compost a 6-inch potful of fine bone meal or steamed bone flour may be added, and about 4 oz. of lime. The last ingredient is important, as most potting soils are taken from grasslands that have nearly always been neglected in respect of periodical applications of lime. When using sterilized soil it is important to add 2 oz. of superphosphate to each bushel of compost. Quick-acting and highly soluble manures should never be added to the potting compost, as the bulk of them will be washed away before the plant is in a condition to assimilate them. The proper time to apply highly concentrated and soluble manures is when the plants have well filled their pots with roots, and even then they should be applied with caution and strictly according to directions accompanying them.

A compost such as I have indicated should, with slight modifications, be suitable for the general run of greenhouse plants, with the exception of peat-loving plants, such as Rhododendrons, Ericas, Boronias, etc.

All this preamble may seem wearisome and unnecessary, and you may wonder when I am going to say something about the plants themselves, but I can assure you it is very important, for a knowledge of correct cultural methods is the foundation of success.

Coming to the plants themselves, the term greenhouse plant includes a very wide and varied range. In the past it was more

strictly limited in this application, and was generally applied to the many hard-wooded plants from Australia and South Africa, and to the many beautiful bulbous plants natives of South Africa. Naturally many other plants were grown, but the general taste was for collections of choice species, many of them, alas, lost to cultivation to-day.

At the present day many more so-called florists' flowers are grown, such as *Cinerarias*, *Cyclamens*, *Calceolarias*, *Begonias*, *Primulas*, etc., all of which, at the present time, are represented by greatly improved strains. Another feature of greenhouse furnishing is the great variety of hardy and half-hardy annuals that are used for the embellishment of the greenhouse. Many plants of this class owe their popularity to the fact that they give a quick return, are useful for house decoration, and in most cases are easily increased by means of seeds and cuttings.

Generally speaking, their cultivation presents few difficulties, most of them growing well in the compost I have already indicated, while many of them, during the summer months, can be grown in cold pits or frames. Others, such as *Begonias* of the Lorraine type and other winter-flowering *Begonias*, *Jacobinias*, *Eranthemums*, *Streptocarpus*, *Gloxinias*, etc., enjoy an intermediate temperature during their growing season, but when in flower may, with advantage, be removed to the cooler greenhouse.

The number of greenhouse plants is so large that one can only hope to deal with the subject in a general sort of way, and indicate in the time at one's disposal the most interesting and beautiful of them. I will first of all deal with the permanent furnishing of the conservatory or greenhouse, in the hope that I may give you a few hints as to how the upkeep of such buildings may be reduced and made easier. For example, beds and borders in such houses that are normally kept furnished with pot-grown plants could, in part at least, be planted out with permanent subjects.

There are many beautiful plants suitable for this work—in fact, many of them are only seen at their best when planted out in such positions. They include some of the best and smaller growing *Acacias*, such as *Acacia pulchella*, *A. hastulata*, *A. Drummondii*, *A. platyptera*, *A. longifolia* var. *mucronata* (fig. 53), *A. Baileyana* and *A. cultriformis* with beautiful silvery foliage. *Camellias* are also indispensable, giving preference to some of the beautiful single varieties that are becoming so popular. They include such varieties as *Camellia japonica* 'Lady Clare,' *magnoliaeflora*, 'Kimberley,' *grandiflora* and *C. maliflora*, a gem with small double rose-coloured flowers. *Chorizema ilicifolium* is seen at its best when planted out, and is also excellent for covering a pillar, as also is *Sollya heterophylla*, and wherever possible room should be found for *Luculia gratissima* (fig. 54) or *L. Pinceana*, both of which can only be successfully grown in this way. There is also a great variety of greenhouse *Rhododendrons*, such as 'Lady Alice Stanley,' *R. fragrantissimum*, *R. Edgeworthii* and *R. formosum*, and the many beautiful

Javanese hybrids. *Agapetes buxifolia*, *Pentapterygium serpens*, *Leucopogon lanceolatus*, *Burchellia capensis*, *Alberta magna*, and many others can be used in like manner. The edges of the beds or borders can be finished off and made attractive by the use of ferns, *Selaginella*, *Helxine Soleirolii*, and *Liriope spicata* var. *variegata*. *Primula obconica* in many varieties is also very useful, as well as *Corydalis thalictrifolia*.

Climbing plants for furnishing rafters and pillars must not be overlooked. They should be selected with care and be of such a character that they do not unduly shade the other occupants of the house. Many of the freer-growing varieties of Fuchsia are ideal for this purpose, so are *Cestrum elegans*, *C. Newellii*, *Plumbago capensis*, *Jasminum grandiflorum*, *J. primulinum*, *J. azoricum*, and strangely enough, *J. rex* from Siam, which has done better in a greenhouse than in a higher temperature, *Hidalgia Wercklei*, the Climbing Dahlia, *Trachelospermum jasminoides*, *Mandevilla suaveolens*, Bougainvilleaeas, the smaller growing variety 'Mrs. Butt' being suitable for smaller houses, *Passiflora caerulea* and *Hibbertia dentata*. *Tibouchina macrantha* is ideal for covering a high wall, as also is *Streptosolen Jamesonii*, the flowers of which come a wonderful colour if fully exposed to all possible sun and light.

For small houses where large and permanent plants would be unsuitable, there is quite a variety of climbers of a light and elegant habit that can be easily raised from seed and flowered in the same season. They include *Rhodochiton volubile*, *Ipomoea versicolor* (*Mina lobata*), *I. coccinea*, *I. Quamoclit* and *I. rubro-caerulea*, *Maurandia Barclaiana*, *M. scandens* and *Thunbergia alata*.

Turning to what may be considered the more permanent inmates of the greenhouse, they may be divided into two classes—viz. what are known as hard- and soft-wooded plants. Taking the hard-wooded section first, we find that it includes many plants from Australia, commonly known in the past as New Holland plants. At one time they were very popular, but now, with the exception of a few showy species, they are but poorly represented in gardens, and, with few exceptions, they are exclusively grown by trade houses for market work. They include some of the more showy Acacias, such as *Acacia Drummondii*, *A. hastulata* (fig. 55), *A. pulchella*, *A. armata* and its varieties, *A. retinodes*, *A. longifolia*, *A. platyptera* and *A. diffusa*. Boronias (fig. 56) are represented by the sweet-scented *Boronia megastigma*, *B. heterophylla* and *B. elatior*. Epacris, which in Australia takes the place of heaths (there are no Ericas in Australia), like the South African Heaths, thrive in a compost of sandy peat. There are many beautiful varieties, probably all seedlings from *Epacris hyacinthiflora* and *E. impressa*. After flowering they should be cut back and encouraged to make fresh growth in an intermediate temperature, gradually accustoming them to cooler conditions as growth matures. *E. miniata* and its varieties make loose straggling growth which should not be cut back, but should be kept tied in to some suitable framework, in time making large specimens.



FIG. 53 —*ACACIA LONGIFOLIA MUCRONATA* AT KFW

face p 124



FIG. 54. *EUCALYPTUS CRATISSIMA*

Correa—commonly known as Australian Fuchsia—is another attractive genus, including several species and varieties, such as *Correa alba*, used as a stock for the more difficult species, *C. ventricosa*, *C. pulchella*, *C. magnifica*, *C. Harrisii* and *C. cardinalis*, the gem of the lot, but unfortunately now very rare in cultivation. *Eriostemon buxifolius*, *E. myoporoides*, *E. intermedius* and *E. scaber* represent another beautiful genus, and *Crowea angustifolia* and *C. saligna* should also be included.

There are many other beautiful and interesting Australian plants, such as *Leschenaultia biloba*, *Leucopogon lanceolatus*, *Lomatias*, *Pimeleas*, *Tetradleas*, etc., one of the most striking being the 'Desert Pea,' *Clanthus Dampieri*, with its silvery foliage and vivid scarlet flowers, with a scarlet blotch at the base. It is easily raised from seed, but has always, and not without reason, been regarded as a difficult plant to grow successfully. This difficulty can, however, be got over by grafting the seedlings on to young seedlings of the 'Bladder Senna,' *Colutea arborescens*.

The South African Heaths, at one time so popular, have in their many beautiful species and varieties practically disappeared from our gardens, with the exception of a few of the easier species and varieties, which are grown in large quantities for market work. They include such species and varieties as *Erica canaliculata* (*melanthera*), *E. candidissima*, *E. gracilis*, *E. gracilis alba*, *E. persoluta alba*, *E. hyemalis*, *E. Cavendishiana*, *E. regerminans* and *E. Willmorei*, of which there are several varieties. Their successful cultivation calls for a high degree of skill and experience; they require very careful watering at all times, especially during the winter months. They have the merit of requiring very little fire heat, as most of them will stand a few degrees of frost without injury. A few other plants are included in the hardwooded section, such as *Adenandra fragrans*, *A. uniflora*, *Anopterus glandulosus*, *Aotus gracillima*, *Audouinia capitata*, *Bauera rubioides*, *Coleonema album*, *Daphne odora*, *Hypocalymma robustum*, *Platythea galioides*, *Grevillea Thelemanniana*, *G. punicea*, *G. asplenifolia*, *Myrtus communis* and its varieties, *Elaeocarpus cyaneus*, *Callistemons*, *Proteas* and *Agathosmas*. There are many other woody greenhouse plants that, on account of their softer character, are easier to propagate and grow. A few of them are *Asystasia bella*, *Bouvardias* in variety, *Brunfelsia calycina* and its fine variety *macrantha*, *Buddleia asiatica* (fig. 57), *B. officinalis*, *Clanthus puniceus*, *Cytisus fragrans*, *Datura sanguinea*, *D. suaveolens*, *Erythrina Crista-galli*, *Helichrysum* (*Aphelaxis*) *humile*, *Lantana Camara* and *L. salvifolia*, the last an excellent plant for covering pillars. *Leptospermums*, *Limonium* (*Statice*) *arborescens*, *L. macrophyllum*, *L. profusum*, *L. roseum* and *L. brassicaefolium* (which is best raised from seed), *Polygala myrtifolia*, *Prostanthera rotundifolia* and *Sparmannia africana*. Here may be included the many varieties of Indian Azaleas, *Rhododendron indicum*, large specimens of which used to be common in gardens, but which are now generally represented by small plants annually imported in large quantities from Belgium.

The many beautiful varieties of *Rhododendron obtusum*, commonly known as Kurume Azaleas, are quickly increasing in favour. They are easily increased by means of cuttings, and some of them can be had in flower at Christmas without forcing (fig. 58).

We may turn now to what are known as the soft-wooded plants. Here we have an enormous variety, some of them sub-shrubby, others more or less herbaceous, and many biennial. In dealing with the general run of soft-wooded greenhouse plants, there is perhaps no section of them of such prime importance as Begonias, for in their many species and varieties they can be depended on to keep the greenhouse furnished all the year round. Their successful cultivation presents few difficulties, as they are easily propagated by means of cuttings or seed, and they grow freely in any good compost. Some of them, such as 'Gloire de Lorraine' and its varieties and *Begonia manicata*, enjoy an intermediate temperature during their growing season, but when in flower stand quite well in an ordinary greenhouse. *B. manicata*, if kept in a warm house when in flower, is poor in colour and finished in a few weeks, but in a cool greenhouse it keeps in perfect condition for over three months, and when grown on into large specimens is the finest of all the greenhouse Begonias, attaining a height of over 4 feet. Other useful greenhouse Begonias are *B. Evansiana*, the first Begonia introduced and nearly hardy, *B. coccinea*, *B. fuchsiioides*, splendid for covering a back wall, *B. Dregei* (with *B. socotrana*, the parent of 'Gloire de Lorraine'), *B. boliviensis*, *B. Davisii* and *B. Pearcei*, three of the progenitors of our present-day race of tuberous-rooted Begonias, *B. Hoegeana*, *B. Ingramii*, *B. acuminata*, *B. Lynchiana*, *B. gracilis*, and *B. semperflorens* in many beautiful varieties which are best raised from seed and may be had in flower all the year round. Then there is *B. Sutherlandii*, one of the parents of *B. weltoniensis*, an old favourite and at one time common in cottage windows. I need only mention the numerous varieties of tuberous-rooted Begonias; they are easily raised from seed, or where convenience does not exist for this, dry tubers can be purchased at a price to suit all pockets.

Among the great variety of soft-wooded plants it is difficult to make a selection. They include such well-known plants as Abutilons, of which *Abutilon insigne*, *A. megapotamicum* and *A. Milleri* are to be recommended as roof-climbers, and *Beloperone guttata*, which will give a display for at least six months—this plant recently received an Award of Merit and the Sander Medal for the best greenhouse plant shown during 1936—*Calceolarias*, *Centropogon Lucyanus*, *Chironia linoides*, Chrysanthemums, *Clerodendron fallax*, *C. ugandense*, *Coleus barbatus*, *C. thyrsoides*, as well as the numerous garden varieties of *C. Blumei*, *Daedalacanthus (Eranthemum) nervosus*, *Eranthemum seticalyx*, *Eupatorium atropurpureum*, *E. ianthinum*, *E. macrophyllum* and *E. Purpusii*, Aster, *Francoa ramosa*, *Fuchsia corymbiflora* and the numerous garden varieties, *Heterocentron roseum*, Hydrangeas in many varieties, *Impatiens Holstii*, *I. Oliveri* and *I. Sultani*, *Jacobinia*

carnea and *J. chrysostephana*, *Manettia (bicolor) inflata*, *Moschosma riparium*, Pelargoniums in many varieties, *Plumbago rosea*, *Pycnostachys Dawei*, *Reinwardtia tetragyna* and *R. trigyna*, *Ruellia macrantha*, *Salvias*, and *Scutellaria costaricana*.

There is also a great variety of choice bulbous and tuberous-rooted plants available for the cool greenhouse, and from South Africa alone there are Freesias, Ixias, Sparaxis, Babianas, Lachenalias, Watsonias, Tritonias and Nerines. All the South African bulbous plants are specially useful, for during no period of their cultivation do they require more heat than can be afforded in a cool house or cold frame. With the exception of Nerines, the cultural details are the same for them all. If we take Freesias as an example, they should be potted during August or early September. After potting, stand them in cold frames and keep shaded until they are well rooted and show signs of growth; afterwards give plenty of air, according to the weather conditions, as they dislike a close, stuffy atmosphere, and should be given no more fire heat than is necessary to exclude frost. There are now many beautiful varieties of Freesia; and Freesias may be easily raised from seed, and from a sowing made during March, I have flowered them the following November. I mentioned Nerines as an exception. While the cultural conditions are the same, Nerines, unlike the other bulbs referred to, should not be repotted every year. Watsonias require large pots, 6 or 7 inches in diameter; it is surprising that they are not more generally grown. Other bulbous and tuberous plants are Achimenes, Gesnerias, Sinningia (Gloxinia), Isoloma, Oxalis, Agapanthus, *Bravoa geminiflora*, Cannas, Clivias, Crinums, Cyrtanthus, *Eucomis punctata*, *Gloriosa Rothschildiana*, Haemanthus, Hippeastrum, Hymenocallis, *Veltheimia viridifolia*, *Zantedeschia (Richardia) africana*, *Z. Elliottiana*, *Z. Penlandii* and *Z. Rehmannii*.

Most bulbous and tuberous-rooted plants require careful cultivation. In the first place, after repotting, water must be very sparingly afforded until they have made a quantity of roots and started into growth, and after they have finished flowering they should not be neglected, but should be carefully watered and manured until the foliage shows signs of dying down, when water should be gradually withheld. In addition to the choice bulbous plants I have mentioned, there are all the hardy bulbs that are used in such large quantities for forcing purposes. They include many beautiful varieties of Narcissus, Tulip and Hyacinth, as well as many small bulbs, such as Scillas, Chionodoxas, Muscaris and Crocuses, that are so useful for small houses.

Apart from the great variety of plants that are propagated by vegetative means, we have available a large range of plants that can be raised from seed. They include Primulas, an important group of greenhouse plants, the Chinese Primula, *Primula sinensis*, in its many varieties being a host in itself. Their successful cultivation presents no difficulty; just one hint—I have found that they enjoy old mortar rubble in the potting compost. *P. obconica* is also available in many

varieties, as also is the newer *P. malacoides*, of which there are now many varieties. Other good Primulas are *P. verticillata* and *P. floribunda*, the parents of *P. kewensis*, the seed-producing form of which is deservedly popular. The original *P. kewensis*, which is sterile and has to be propagated by division, is now, unfortunately, very scarce—unfortunately, because it is a much more graceful plant than the seeding form. *P. Forrestii*, which is on the border-line of hardiness, is also good for a cool house, while the small and dainty *P. Forbesii* is well suited for a small house. With all Primulas it is very important to have fresh seed. This is also true of Cyclamens, which belong to the same natural order. Generally they are not so easy as Primulas. Seed should be sown during August, the young plants being given an intermediate temperature during the winter. During the summer months they are best in low pits or cold frames, where they enjoy cool, moist conditions and shade from strong sunshine. In their many beautiful colours they are very useful for decorative work. Also included in this section are Calceolarias, Cinerarias, Impatiens, *Asclepias curassavica*, *Browallia speciosa major*, Celosia, *Celsia Arcturus*, and *C. cretica*, *Clerodendron fallax*, *Humea elegans*, *Eustoma Russellianum*, *Exacum affine*, Petunias, *Salvia splendens* in many varieties and *Trachelium caeruleum*.

In addition to the foregoing, hardy and half-hardy annuals are now largely used for greenhouse decoration. Kew must have been the pioneer in using this class of plant for greenhouse decoration, for when I first went there in 1895, gardeners used to scoff at us for growing such weeds in pots. Well, it is not so easy as some of them used to imagine, for the life cycle of annuals is short, and if they receive a check they do not easily recover—in fact, to ensure success, they require careful watering and attention to cultural details during all stages of their cultivation. For a spring display they should be sown about the middle of September. They are best sown very thinly in pots or boxes in a cool house or cold frame, pricking the seedlings out as soon as they are fit to handle. When large enough they should be potted up into small pots, either singly or three or four in a pot, according to the particular plant being dealt with, afterwards potting them on as they require it. During the winter months they should be given a light, airy position well up to the roof glass, with abundance of air on every possible occasion. Such plants as require it should be kept neatly staked and tied as soon as necessary : some of the more slender growing being best supported by the use of slender twigs of birch or hazel.

Many of our hardy and half-hardy annuals have been greatly improved by selection, and many beautiful varieties are available for this phase of greenhouse furnishing. Some of the most popular and useful for this purpose are as follows—viz. *Browallia elata* and *B. viscosa*, *Chrysanthemum carinatum* and *C. segetum*, Clarkias in many fine varieties, *Collinsia bicolor*, *Delphinium Consolida* in variety, *Diascia Barberae*, *Dimorphothecas*, *Gilia coronopifolia*, *Godetias* in



FIG. 55. *ACACIA HASTULATA* AT KEW

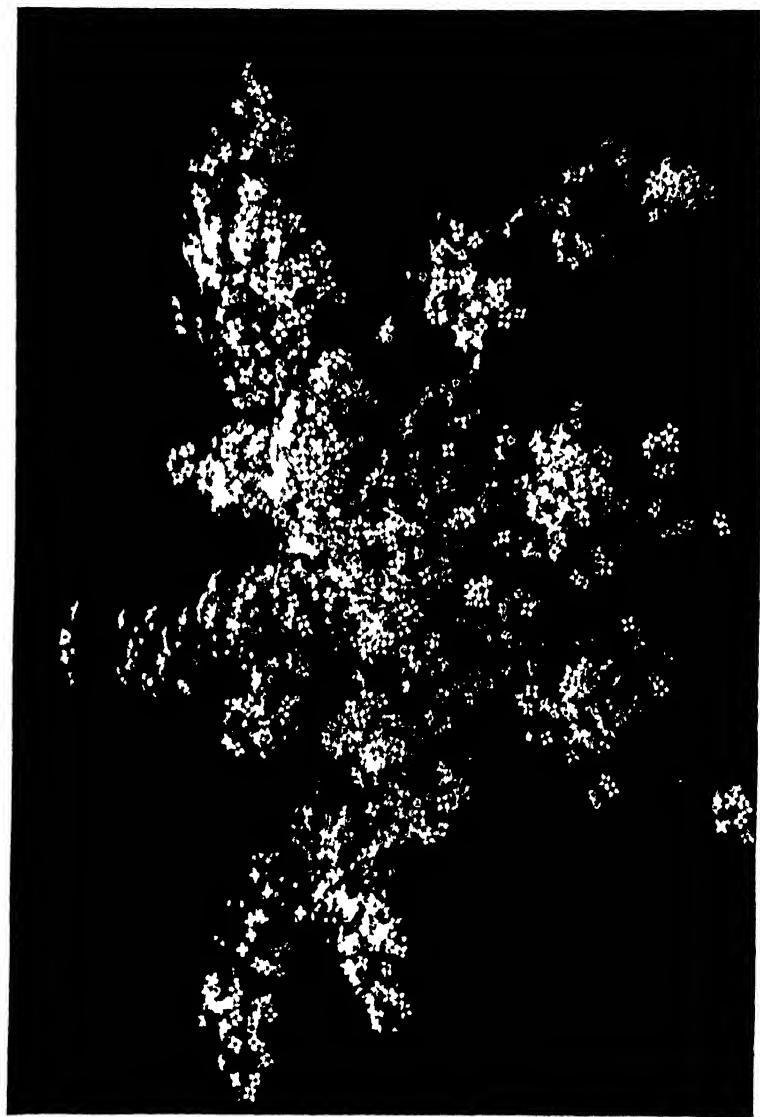


Fig. 56 BORONIA FASTIGIATA

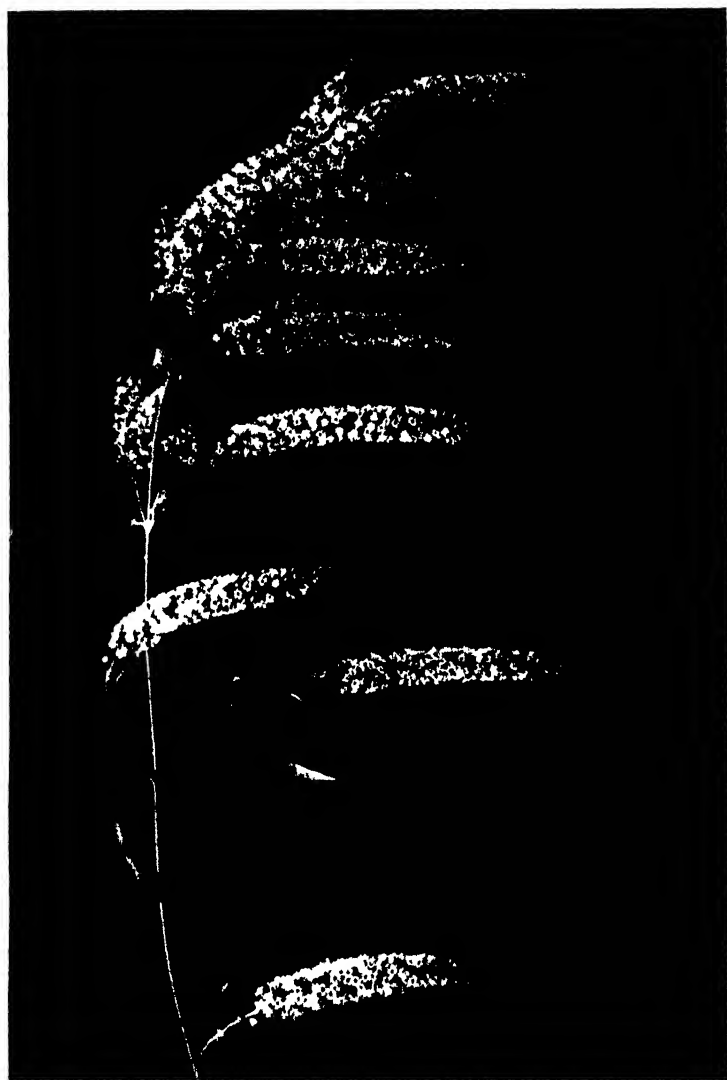


FIG 57 BUDDLIA ASIATICA



FIG. 55. RHODODENDRON OBTUSUM KAFKAPILRI

many varieties, *Linarias*, *Linum grandiflorum*, *Lobelia Erinus* in many varieties, *L. tenuior*, *Nemesias*, *Nigella*, *Petunias* in bewildering variety, some of the small-flowered, slender-growing varieties being useful for furnishing hanging baskets, also *Phlox Drummondii* and *Reseda odorata* (Mignonette). I wonder how many present-day gardeners know that Mignonette is a perennial, even if a short-lived one, and can be grown into large specimen bushes or small standards. Then we have *Salpiglossis*, *Scabiosa*, *Schizanthus*, *Limonium* (*Statice*) *Bonduellii*, *L. sinuata* and *L. Suworowi*, *Torenia*s, *Trachymene caerulea*, *Tropaeolums*, *Ursinias*, *Viscarias*, *Zinnias* and many varieties of annual stocks and double wallflowers. There are many other annuals that can be used for this purpose, there being sufficient variety to keep a house gay for many months, as an autumn display can be obtained by sowing during June.

While flowering plants provide most of the material for furnishing the greenhouse, for a pleasing and artistic arrangement foliage plants are also essential. For this purpose there is quite a number of greenhouse ferns. There is also available a number of fine foliage plants that can be easily raised from seed each year: they include *Lophantha*, *Asparagus Lutzii*, *A. plumosus nanus* and *A. Sprengeri*, *Eucalyptus citriodora* and *E. Globulus*, *Grevillea robusta*, *Jacaranda ovalifolia*, *Kochia trichophylla*, *Melianthus major* and *Sutherlandia frutescens*.

Where the house is large enough, there are many plants that can be used for hanging baskets (fig. 59), such as *Asparagus Sprengeri*, *Columnea Banksii*, *Campanula isophylla*, *C. isophylla* var. *alba*, *Clianthus Dampieri*, *Begonias* of the 'Gloire de Lorraine' type, *Begonia glaucophylla*, *Ceropegia Woodii*, *Manettia inflata*, ivy-leaved *Pelargoniums*, *Thunbergia alata*, *T. Gibsonii*, and a number of slender growing annuals.

Besides these there is a great variety of hardy flowering trees and shrubs and herbaceous plants available for forcing and invaluable for furnishing the greenhouse and conservatory during the earlier months of the year.

Insect pests are always a menace where a large collection of greenhouse plants is grown, but much can be done to prevent them by clean cultivation and the production of healthy plants, which are more resistant to disease and insect attacks. Prevention is always better than cure, and timely precautions should be taken to prevent infection by the use of suitable insecticides used according to directions. One insidious pest, the so-called *Begonia Rust*—the injury is really caused by the attacks of a small mite—is easily prevented by the occasional use of the sulphur vaporizer.

OLD GARDEN ROSES.

By the Hon. ROBERT JAMES.

LOVERS of the flower garden will no doubt be pleased not only to see but also to own Mr. EDWARD BUNYARD's book on Old Garden Roses.* Just as there should be a place in every flower garden for these Roses, so should there be a record of them on every garden lover's bookshelf. REDOUTÉ's great work is beyond the means of most of us, and therefore not at hand to be consulted when we most need it. The old rose trees, when we see them, have long since lost their labels, if indeed they ever had them, and their names are usually a matter of conjecture. Now Mr. BUNYARD gives us a descriptive catalogue which will help us definitely to identify and name. In addition to that he gives us a history of garden Roses from the earliest times and in different countries, written beautifully and with charm of expression. He has command of his own language as well as knowledge of his subject.

Those who can appreciate the beauty and the subtle charm of these old Roses : those of us who are old enough to remember seeing them in their childhood and for them to conjure up associations with the past, will find themselves wondering how these lovely flowers with that strange personal quality ever came to be driven from the garden systematically, recklessly, and to be replaced by such poor substitutes. Mr. BUNYARD, in his introduction to the book, attributes it to two causes—the so-called perpetual properties of the modern Rose, and to fashion. Since the length of time a plant is in flower must be a matter of moment to all except those who own the largest garden, the former would seem to be a possible excuse—I cannot accept it as a reason, otherwise people would grow nothing but perpetual flowering plants, and they do not. Why then ask something of their rose trees that they do not expect to find in other plants and shrubs ? If the modern rose trees bore such roses as the old rose tree bears, and bore them in such a way, then let us have the modern Rose, but so far I have searched in vain. On the other hand I cannot accept fashion as a reason nor even as an excuse. Fashion is not so much a cause as an effect. It is a survival of the flock instinct. One sheep leads. The rest follow. Somebody or something was the cause. I believe it was the flower show on the one hand and the nurseryman on the other. The flower show demanded size and conformity to certain preconceived forms. The nurseryman accepted the flower show standard as his and extolled the virtues of all that was largest and brightest, as most likely to appeal to his customers. Roses have not been singular in

* "Old Garden Roses." By E. A. BUNYARD. xii + 163 pp. 1s. 8vo. (Country Life, London, 1936.) 15s.

this respect. Most orders of plants that are widely cultivated have suffered similarly. In almost every catalogue we see extolled some mammoth flower or one that is glowing scarlet. They are, in fact, advertisements in themselves. For the show bench they are all that can be desired—they may even serve a good purpose as florist's flowers; but what they lack are garden properties—and it is in garden properties that the old Rose excels. We of our generation are not alone to blame. Our predecessors were equally guilty. Even Dean REYNOLDS HOLE, who realized the garden properties of the old Rose, says: "the white and red roses of my childhood have left the garden in which they grew. I see the former sometimes by old farmhouses and in cottage plots wildly vigorous as a gipsy's hair . . . recalling of the older Pliny that once upon a time the land we live in was named after its white roses Albion. . . . But the latter, the damask with its few rich velvety crimson petals, is a memory and that is all. *Nor do I ask for a restoration in either case, only that they may be replaced by better roses.*" But were the Roses he craved after better Roses? Was he looking for florist's flowers or garden plants? We cannot help suspecting that it was the former, for we find him extolling 'Cramoisie Superieure' when his praise should have been for the original 'Cramoisie,' or as I believe it was called, rightly or wrongly, the Swan's-necked Rose.

Perhaps he wanted both. He was a Rose show enthusiast, carrying off prizes here, there and everywhere, but still we find him saying, "My selection of garden roses, that is the roses that are most beautiful upon the tree, but not most suitable for exhibition. . . ." Here indeed is the matter in a nutshell. The old Roses are the most beautiful upon the tree and as garden plants pure and simple beyond praise. They grow beautifully. They give flowers in profusion. Most are very sweetly, some even divinely scented. They are easily associated with other plants, whether it be from the horticultural or the æsthetic standpoint. Above all they have that indefinable quality, charm.

There is perhaps yet one more reason for the disappearance of the old Rose. Some forty or fifty years ago the fashion for flowers arranged in globe glasses like posies was superseded by flowers arranged in taller vases and therefore flowers with longer stems. The 'American Beauty' Rose was being talked about. A Rose with a long stem, the Rose we see to-day in every florist's shop. People wanted them. They were easy to arrange and they looked expensive, but they were forgetting that the paintings of FANTIN LATOUR or of MANET or of VAN HUYSEM were not arranged thus, nor were they of these Roses.

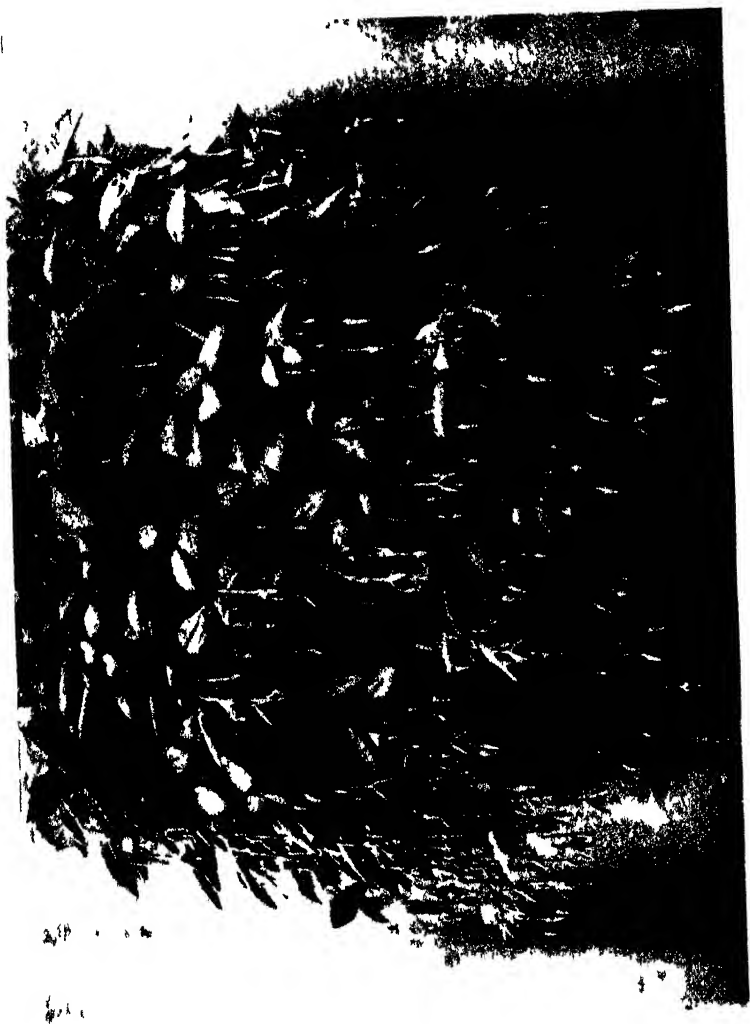
We hope that Mr. BUNYARD's book will help to bring us back to a right judgment, that it will be an encouragement to those who already grow these old Roses, and an inducement to those who do not to get them. True they are only in flower during four to six weeks, but the garden is fuller of delight then than at any other time. Roses, Lilies, what more can anybody wish for?

Some of these old Roses which we think are lost must still be lingering in the garden of some farm or cottage—it may be in this country or in Ireland, it may be in France. Mr. BUNYARD suggests that the Portland Rose is definitely lost, but even if it is, there are many others we would wish to see—the Burleigh Rose for instance. May it not still be lurking in some cottage garden close to Stamford, although it has disappeared from the Burleigh Garden? Even some which are known still to exist may soon be lost if they are not propagated and more widely distributed. The Lettuce-leaved Rose, than which no Cabbage Rose gives more lovely flowers, and which inspired REDOUTÉ to do one of his best drawings, though Mr. BUNYARD, for reasons which I cannot understand, disparages it, may soon vanish. In addition to saving these lovely things for posterity, there is always the chance—if we keep our eyes open—of finding one that is thought to be lost. The lucky finder will get a thrill he has never had before, if he has confined himself to buying his plants at flower shows or from catalogues. It is a search which offers a reasonable prospect of reward. Many of the old Roses had iron constitutions. They asked for little more than to be planted and left alone. Most of them propagate easily from cuttings, and there are few people who would refuse to give cuttings. There are so many places where they may be hiding. To find them many searchers are needed.

Besides helping, as I hope, to restore the old Roses to our gardens, Mr. BUNYARD gives us a most valuable descriptive catalogue. As I have said, most old rose trees have lost their labels, if ever they had them. Some names have been handed down—some perverted, and we have found ourselves in an atmosphere of conjecture and uncertainty. Now we have at last a reasonable chance of giving them their right names. Though I am one of those who prefer the plant to the label, there are many who lay great store by having the correct name, and it must be admitted too that names are often interesting. I will take Plate 23 as an instance. We have an illustration of two Roses which Mr. BUNYARD calls respectively ‘York and Lancaster’ and ‘Rosa Mundi.’ There are two questions I should like to ask. Is there such a thing as a true ‘York and Lancaster’ Rose and is not ‘Rosa Mundi’ a perversion? Rose trees with white and pink and striped Roses on the same plant existed long before people had learned to be exact in the naming of plants. For instance, in Shakespeare we find :

“ The Roses tremblingly on thorns did start,
One blushing red, the other white despair,
A third nor white nor red had stolen of both
And to this robbery had annexed their breath.”

Who can say that he was talking of *Rosa damascena versicolor* or *R. gallica versicolor*? It could just as well be one as the other. If anything it is more like the latter because the *gallica* is the redder of the two. What could be more natural in this country than to call



16 59 LUCHSIA MACILLANICA CALEDONIA



FIG. 60. A FINE HYBRID NALCETTA.

To Jacc p. 193

any tree bearing the White Roses of York and the Red Roses of Lancaster a 'York and Lancaster' Rose, and is it not a descriptive rather than a specific name? REDOUTÉ gives us two 'York and Lancaster' Roses. He says in vol. i, p. 110, "*Rosa damascena* var. (*bifera*) *alba* et *rosea* ou le Rosier de Portland donne fréquemment sur le même pied des fleurs toutes roses et des fleurs toutes blanches ce qui l'a fait appeler en Angleterre les Rosier de Yorck et Lancaster." And in vol. i, p. 137, "*Rosa Damascena variegata* ou les Rosier de Yorck et Lancaster cette belle variété connue sous les noms de Rose de Yorck et Lancaster. Rose des quatre Saisons panachée ou le Damas panaché a été propagée par Monsieur du Pont qui l'avait recue d'Angleterre sous le nom de *Rosa damascena bicolor*." REDOUTÉ's drawing shows a Rose with the outer petals blotched, not striped. Of 'Rosa Mundi' I cannot find he makes any mention under this name. *Rosa gallica versicolor* ou le Rosier de France is, however, figured (vol. i, p. 135): "Notre rose est connue en France sous les noms de Provins panachée ou de Provins œillet. Les Anglais l'ont appelée Rosemonde du nom de la belle et spirituelle maîtresse du roi Henri II . . . au reste Rosamonde dérive de l'Allemand rosen (rose) et mund (bouche) ou Bouche de Rose. C'est un nom Chevaleresque que portait beaucoup de demoiselles en Allemagne." Miss LAWRENCE does call it 'Rosa Mundi,' but if we accept REDOUTÉ as an authority we find an interesting and not altogether improbable name perversion. It would not be the only time such a thing had happened: in fact we know of many instances. Even making every allowance for the raiser's natural enthusiasm there would seem to be little justification for calling it the rose of the world. Sporting occurs in wild as well as in garden plants. For instance, I have a plant of *R. mollis* collected near High Force in Teesdale that regularly bears white and pink flowers, and if these things happen in the wild state now we can reasonably assume that it was happening centuries ago. 'Rosemonde' seems to me not only the most appropriate name but also the most probable one, and I would therefore rather accept REDOUTÉ as my authority than Miss LAWRENCE.

In determining his old garden Rose Mr. BUNYARD fixes his date limit as 1840, but he excludes the Tea Roses, although he tells us (p. 50) that the race of Tea Scented Roses owed their origin to a plant introduced in 1809 by Sir A. HULME. Inconsistencies of this kind cannot be objected to; in fact this is not the only instance where he breaks his rule, and wisely, for we find Roses mentioned which were unknown in 1840. What I do regret is that certain Roses which we have known all our lives, and which as such we look upon as old Roses, are not mentioned. I do not suggest that he should have hunted high and low for them, but there have been certain outstanding Roses for which I think there should be a place in every garden; for instance, 'Blairii No. 2,' 'Lamarque,' 'Paul Pétet,' 'Souvenir de la Malmaison,' 'La France,' 'Papa Gontier,' 'Maman Cochet.' If he has occasion to print another edition, I hope he will find a place for them.

The illustrations, after the excellent wrapper, I find somewhat disappointing. The old paintings have been so reduced in size that it is difficult to discover the Roses in them except in the case of the VAN HUYSEM, and even here it probably would have been better had he only reproduced the Roses in the bottom right-hand corner. The Roses in the Wilton Dyptich, even in the original, amount to nothing—they are just double Roses and mechanically painted. If instead of going to the National Gallery for pictures to reproduce he had turned to the illuminated manuscripts of the Middle Ages and the Early Renaissance, I believe he would have found paintings of Roses faithfully drawn and capable of being reproduced as in the original. For instance, Mr. CHARLES JAMES tells me of two such manuscripts in the Holkham Library. "One is the Bible of Images executed about A.D. 1300, in which the Virgin appears at the tip of a Jesse Tree issuing from a half-blown Crimson Gallica Rose, such as used to be called a Damask Rose. In the other, the beautiful Book of Hours, painted by the miniaturist FRANCISCO ANTONIO CHERICE for LORENZO DE MEDICI and CLARICE ORSINI, the Rose which was the badge of the Orsini appears on almost every page. It is a double Rose with flat petals, like a 'Black Tuscany,' sometimes pink, sometimes red, of a very round shape." There must be many more such manuscripts, some with Roses like these, others with Roses that suggest the Burgundy Rose.

The photographs too are not all that one could wish. Is it that the camera tells the truth in an untruthful way? Is it that the old Rose is not photogenetic? Is it that we have been spoiled by VAN HUYSEM, by MANET, by FANTIN LATOUR, by REDOUTÉ? I cannot say, but the fact remains that these are after all small matters. It is the book itself with which we are concerned. I am grateful to Mr. BUNYARD for it. I am glad to have it and I am sure others will be too.

ZEPHYRANTHES, PYROLIRION, HABRANTHUS AND HIPPEASTRUM.

BY J. R. SEALY, B.Sc.

THE names of the plants belonging to the four genera dealt with in this article are in a somewhat confused state, in literature as well as in gardens. The confusion has arisen partly because the differences between the genera have not been properly described, and partly because two of the genera have been merged with the other two by a number of writers.

All four genera were established by Dean HERBERT—*Zephyranthes*, *Pyrolirion* and *Hippeastrum* in 1821, and *Habranthus* in 1824—and all four were maintained by him in his book *The Amaryllidaceae*, published in 1837. J. G. BAKER, however, recognized only two of them in his *Handbook of the Amaryllideae* (1888), placing some species of *Habranthus* in *Zephyranthes* and the remainder in *Hippeastrum*, and including all the species of *Pyrolirion* in *Zephyranthes*. Since 1888 most writers have followed BAKER, but in 1927 the late Dr. STAFF, who had occasion to study the genera when preparing the text to accompany t. 9126 of the *Botanical Magazine*, came to the conclusion that all four genera could be accepted as defined by HERBERT; he therefore restored *Habranthus* as a genus in his article and named the plant figured *Habranthus robustus*.

Some months ago Major A. PAM of Wormley Bury, Broxburne, Herts, supplied material of an Argentine plant, *Hippeastrum Jamesoni*, for figuring in the *Botanical Magazine*, and since this species has become known under the name *Habranthus Jamesoni*, it was necessary, in view of the resuscitation of *Habranthus* by STAFF, to decide whether the plant was a true *Habranthus* or whether it was really a *Hippeastrum*. From the investigations that were made in connexion with this problem, the conclusions set out in the present article were reached.

The first step was to make sure of the identity of the genus *Habranthus*. In his article Dr. STAFF wrote :

“ As I have, after a scrutiny of the group concerned, come to the conclusion that Herbert's concept of these genera is still on the whole the most natural and rational, I have restored *Habranthus*, as a genus distinct from *Hippeastrum* in being of smaller stature and in having more delicate obliquely erect to almost horizontal flowers which normally are produced solitary from a tubular upwards bifid spathe. The genus is confined to South America and with few exceptions is extra-tropical,”

but on examining *H. Jamesoni* it was found that this species does not possess the “ tubular upwards bifid spathe ” which STAFF gives as

one of the characters distinguishing *Habranthus* from *Hippeastrum*. Moreover, reference to HERBERT'S *Amaryllidaceae* showed that in this work HERBERT had included in *Habranthus* a number of species which, like *H. Jamesoni*, did not possess the type of spathe described by STAFF.

Now the first species of *Habranthus* to be described was *Habranthus gracilifolius* (Bot. Mag., t. 2464), and it was from this species that HERBERT drew the characters for the genus. *H. gracilifolius* is therefore the "type-species" of the genus *Habranthus*, and forms the standard to which other species must conform if they are to be included in this genus; examination shows that the spathe in *H. gracilifolius* is actually of the type described by Dr. STAFF.

On the other hand *H. Jamesoni*, like a number of other species that have been placed in *Habranthus*, was found to have a spathe like that characteristic of *Hippeastrum*—to which genus BAKER had referred these species, and to which they undoubtedly belong.

In the following sections of this article an attempt is made to explain the confusion regarding the identity of *Habranthus* and to clarify the distinctions between this and the other three genera, and it is hoped that this will help to straighten out the confused nomenclature and put it on a firmer basis than hitherto.

CHARACTERS USED IN DISTINGUISHING THE GENERA.

In the key to the genera in HERBERT'S *Amaryllidaceae*, pp. 58, 59, the primary characters for distinguishing the four genera are given as follows:

Perianth declined, tube abbreviated	.	<i>Hippeastrum</i>
„ „ „ not abbreviated		<i>Habranthus</i>
„ sub-erect	. . . . .	<i>Zephyranthes</i>
„ erect	. . . . .	<i>Pyrolirion</i>

Other characters are mentioned on these pages, whilst fuller diagnoses are given on pp. 71 and 72 (in Latin), and in the main body of the work immediately before the account of the species in each genus. From these sources the following *comparable* diagnoses have been compiled:

HIPPEASTRUM: *perianth* declined, tubed, tube abbreviated underneath, upper sepal wider, lower petal narrower; *faucial membrane*, when manifested, deficient on the lower side; *filaments* declined, recurved, inserted in the tube at different levels, the upper sepaline longer and inserted higher, the lower petaline shorter and inserted lower; *anthers* pendulous from the upper third; *style* declined, recurved.

HABRANTHUS: *perianth* declined, short-tubed, subcampanulate, alternate segments nearly equal; *faucial membrane* annular; *filaments* (properly of four lengths) inserted alike at the mouth

of the tube, declined, recurved, semi-fasciculate; *anthers* affixed at the middle, incumbent, versatile; *style* declined, recurved.

ZEPHYRANTHES: *perianth* suberect, more or less tubed, alternate segments sub-equal, spreading out in the sunshine; *faucial membrane* inconspicuous, not annular, manifested (if at all) by six very minute points above the insertion of the filaments; *filaments* inserted at the base of the segments just above the tube, connivent, of alternate lengths, spreading; *anthers* linear, affixed below the middle, sub-erect, versatile; *style* generally declined.

PYROLIRION: *perianth* erect, tube cylindrical, limb ventricose campanulate with reflexed points, the alternate segments equal; *faucial membrane* . . .; *filaments* equally inserted at the throat of the tube, equal or alternately equal, sub-erect, spreading; *anthers* versatile; *style* erect or sub-erect.

From the above it will be seen that HERBERT relied chiefly on the position and form of the flower, the relative lengths, point of insertion and position of the stamens, and on the nature of the "faucial membrane" or corona.

BAKER divided the whole of the species of the four genera into two groups on the basis of the nature of the spathe and the number and position of the flowers, and to these two groups he accorded generic rank. In one group the spathe is a single structure, tubular and sheathing below, free upwards, whilst the flowers are solitary and erect or sub-erect (see fig. 61, 1, 2, 4, 6 and 11); this group BAKER accepted as *Zephyranthes*. In the other group the spathe consists of two simple opposite valves, quite free from one another right to the base, the flowers are usually two or more in an umbel, and declinate (see fig. 61, 5 and 13); this was his *Hippeastrum*. Not only is the character of the spathe very convenient and easily observed, even in poorly prepared herbarium specimens, but its use leads towards a very natural sub-division of the material, and it is therefore important taxonomically.

HERBERT appears to have ignored this character completely in differentiating the genera, and this may account for the confusion into which he eventually brought his genus *Habranthus*, for some of the species that he himself included in this genus have one type of spathe, and some have the other type. But if HERBERT erred with regard to the spathe character, BAKER was at fault when we turn to the character of the stamens. HERBERT had included within *Zephyranthes* those species that had solitary more or less erect flowers and erect regularly arranged stamens in two sets, three longer alternating with three shorter (see fig. 62, 14). In *Habranthus*, as in *Hippeastrum*, he had placed species with declinate, rather fasciculate stamens of four different lengths (see fig. 62, 17). When BAKER transferred certain *Habranthus* species to *Zephyranthes*, he ignored this



FIG. 61.—1, *Zephyranthes grandiflora*; 2, *Z. candida*; 3, *Pyrolirion aurantiacum*; 4, *Habranthus robustus*; 5, *Hippeastrum bifidum*; 6-9, spathes of *Zephyranthes* and *Habranthus*; 10-11, spathes of *Zephyranthes candida*; 12, spathe of *Pyrolirion*; 13, spathe of *Hippeastrum* with two bracts. (1-5, $\times \frac{1}{2}$; 6-13, nat. size.)

difference in the stamens, and consequently *Zephyranthes*, as he defined it, included some species with one kind of androecium, and other species with the other kind. BAKER used the differences in form and position of the perianth to some extent in differentiating the sub-genera within *Zephyranthes*, but he did not regard them of generic importance; finally he overlooked the dissimilarity between the spathes of *Pyrolirion* and those of *Habranthus* and the true *Zephyranthes*.

The differences between *Pyrolirion* (figs. 61, 3, 12 and 62, 16) and

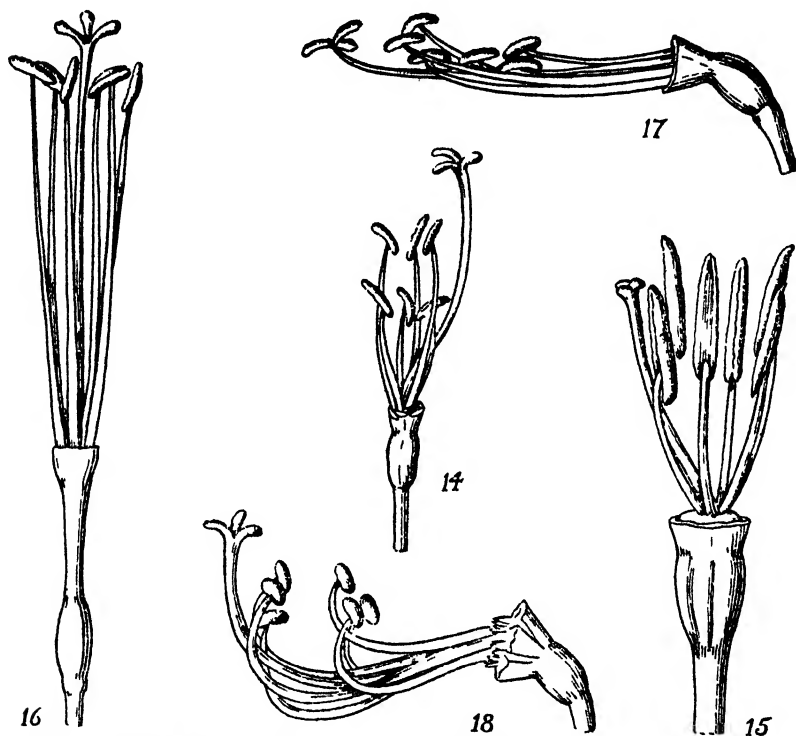


FIG 62—Stamens and style of 14, *Zephyranthes tubispatha*, 15, *Z. candida*; 16, *Pyrolirion aurantiacum*, 17, *Habranthus robustus*, 18, *Hippeastrum breviflorum*. (15, $\times 2$, 14, 16–18, nat size)

Zephyranthes (figs. 61, 1, 6–9, and 62, 14) are such that it is difficult to understand why BAKER chose to treat the former as a sub-genus of the latter, instead of keeping them as distinct genera. The differences will be dealt with fully later, but it may be stated here that in addition to the characters mentioned by HERBERT, there are differences in the spathes and in the shape of the stigmatic lobes. *Pyrolirion* will therefore be omitted, and the following considerations are concerned only with the remainder of the group—*Zephyranthes*, *Habranthus*, and *Hippeastrum*.

Whilst disregard of spathe characters led HERBERT to include a mixture of species within his *Habranthus*, lack of appreciation of the differences in the androecium caused BAKER to include a mixture under

Zephyranthes. It seemed possible, however, that if the characters of spathe and stamens were used in combination, more homogeneous genera might be obtained, and examination of the whole of the material in the Kew Herbarium has shown that this is indeed the case. Three genera can be defined, with differential characters as follows :

	ZEPHYRANTHES.	HABRANTHUS.	HIPPEASTRUM.
Spathe ..	Tubular and sheathing below, upwards free and unilateral, usually bifid but sometimes entire or partially split (fig. 61, 6 to 9).	Tubular and sheathing below, upwards free and unilateral, usually bifid but sometimes entire or partially split (fig. 61, 6 to 9).	Of 2 equal opposite simple valves, quite free from one another right to the base (fig. 61, 13).
Inflor-escence.	1-flowered.	Usually 1-flowered, sometimes 2-flowered, very rarely with 4 flowers (?)	2- to 6-flowered normally, but sometimes 1-flowered.
Flowers ..	Erect to sub-erect.	Oblique to declinate.	Declinate.
Perianth-segments	Sub-similar, 3 inner slightly narrower than 3 outer.	Sub-similar (?) or exhibiting 4-fold disparity.	Exhibiting 4-fold disparity, sometimes sub-equal (?)
Stamens..	Erect-spreading, regularly arranged, 3 longer alternating with 3 shorter (fig. 62, 14, 15).	Declinate, fasciculate, unequal, of 4 different lengths (fig. 62, 17).	Declinate, fasciculate, unequal, of 4 different lengths (fig. 62, 18).

It will be observed that *Habranthus* stands between the other two genera and combines the spathe character of *Zephyranthes* with the floral characters of *Hippeastrum*. Or, to put it in another way, *Habranthus* contains those species that closely resemble the fewer-flowered and slenderer species of *Hippeastrum* in everything but the spathes, and in this they resemble *Zephyranthes*. It might be said that to keep the species of *Habranthus* apart from *Hippeastrum* solely on the character of the spathe is hardly justifiable, but the spathe character is very useful and easily observed, and the genera as defined are clearly marked off from one another and would seem to be convenient taxonomic units.

The result is that it is again possible to recognize the four genera *Zephyranthes*, *Pyrolirion*, *Habranthus* and *Hippeastrum*, but not quite in the sense that HERBERT accepted them, the principal emendations being with regard to the concept of *Habranthus*.

These conclusions were reached some months ago, but as at that time the work had been concerned solely with broad generic differences (no attempt being made to work out the species within each genus), it was intended to defer publication of the results until a more detailed investigation had been made. Since then, however, I have had the privilege of discussing the general conclusions with Mr. H. H. HUME of the University of Florida, who has been growing and studying the species of *Zephyranthes* for some years with the view to preparing a monographic account of them. Mr. HUME tells me that as a result of his work he has been tending towards conclusions closely agreeing with those to which I had already come, and he strongly urged me to put on record an account of my conclusions. Mr. HUME has approached

the problem of generic limits within this group from the *Zephyranthes* side, and last year he published an interesting paper in the *National Horticultural Magazine*, Washington, pp. 258-75, entitled *The Correlation of Classification and Distribution in Zephyranthes*. In this paper he outlines the evolution of the classification of the genus up to the arrangement proposed by BAKER in 1888, and followed by HOLMBERG in 1905, that is the division of the genus into three sub-genera, *Euzephyranthes* Holmberg (*Zephyranthes* proper of Baker), *Zephyrites* Baker and *Pyrolirion* Baker. For the purposes of his paper, HUME retains these as sub-genera within *Zephyranthes*, giving the distinguishing characters, an account of the distribution, and a list of species for each sub-genus. The sub-genus *Euzephyranthes* is, of course, equivalent to the genus *Zephyranthes sensu stricto*; sub-genus *Pyrolirion* is our genus *Pyrolirion*; whilst sub-genus *Zephyrites* corresponds, for the most part, to the genus *Habranthus* as defined here. It is with regard to the species of the last genus that there has been so much confusion, and in the following section an attempt is made to explain how this has come about.

THE GENUS HABRANTHUS.

The species included in *Habranthus* by HERBERT in his *Amaryllidaceae*, pp. 157-168, are enumerated in the first column of the table given on p. 202, exactly as they appear in HERBERT's book. The second column contains BAKER's identifications, and in the third column the genera are given according to the concepts outlined here.

From this table it will be observed that the majority of HERBERT's *Habranthus* species belong to *Hippeastrum*, to which genus BAKER referred them, and it must be evident that the presence of these species within *Habranthus* has been responsible for much of the confusion regarding the status and limits of the genus. Moreover it was most unfortunate that BAKER designated some of them "sub-genus *Habranthus*" when he transferred them to *Hippeastrum*, for this has led to a tendency to regard these species as representing the original genus *Habranthus*, whereas the fact is that the type-species of *Habranthus* is *H. gracilifolius*, and hence it is this, and species similar to it, that actually constitute the genus *Habranthus sensu stricto*.

Now it will be noticed that it was precisely these species, *Habranthus gracilifolius*, *H. sylvaticus*, *H. versicolor*, *H. robustus* and *H. Andersoni*, that BAKER referred to *Zephyranthes* sub-genus *Zephyrites*,* and it may be as well to say something here about this name *Zephyrites*. BAKER adopted it from HERBERT's *Amaryllidaceae*, where it appears only in the key to the genera on p. 58, and in the Latin enumeration

* *H. andicola*, also referred to *Zephyranthes* by BAKER, is evidently a *Hippeastrum*, whilst *Z. concolor*, *Z. cearensis*, and *Z. franciscana* are true *Zephyranthes* species. The remaining species that BAKER included in sub-genus *Zephyrites*, namely *Z. mendocensis* and *Z. caerulea*, belong to *Habranthus*.

Herbert's species of <i>Habranthus</i> .	Baker's determination of genera, etc.	Genera according to the present concepts.
1. PLURIFLORÆ. — Upper sepaline filament prolonged, lower petaline abbreviated.		
1. <i>phycelloides</i> . . .	Hippeastrum sub-gen. Phycella	Hippeastrum
2. <i>speciosus</i> . . .	" " Rhodophiala	"
3. <i>pratensis</i> . . .	" " "	"
4. <i>hermesinus</i> . . .	Hippeastrum sub-gen. Habranthus (= bifidum)	"
5. <i>memoralis</i> . . .	Hippeastrum sub-gen. Habranthus (= bifidum)	"
6. <i>intermedius</i> . . .	Hippeastrum sub-gen. Habranthus (= bifidum)	"
7. <i>spathaceus</i> . . .	Hippeastrum sub-gen. Habranthus (= bifidum)	"
Var. 1.		
" 2. <i>angustus</i> . . .	Hippeastrum sub-gen. Habranthus (= bifidum)	"
8. <i>bifidus</i> . . .	Hippeastrum sub-gen. Habranthus	"
Var. 2. <i>litoralis</i> . . .		
9. <i>pulcher</i> . . .	Hippeastrum sub-gen. Habranthus (= bifidum)	"
10. <i>pedunculatus</i> . . .	Hippeastrum sub-gen. Habranthus (= bifidum)	Habranthus
11. <i>hesperius</i> . . .	Hippeastrum sub-gen. Habranthus	Hippeastrum
Var. 1. <i>advena</i> . . .	" " "	"
" 2. <i>pallidus</i> . . .	" " "	"
" 3. <i>mineatus</i> . . .	" " "	"
12. <i>Bagnoldianus</i> . . .	" " "	"
Var. 2. <i>Gilliesianus</i> . . .	" " "	"
2. SUBBIFLORÆ.—One- or two-flowered.		
13. <i>roseus</i> . . .	Hippeastrum sub-gen. Habranthus	Hippeastrum
14. <i>chilensis</i> . . .	" " "	"
15. <i>gracilifolius</i> . . .	Zephyranthes sub-gen. Zephyrites	Habranthus
Var. 2. <i>Boothianus</i> . . .		"
16. <i>sylvaticus</i> . . .	" " "	"
3. UNIFLORÆ.—One-flowered. Upper sepaline filament shorter.		
17. <i>versicolor</i> . . .	Zephyranthes sub-gen. Zephyrites	Habranthus
18. <i>robustus</i> . . .	" " "	"
19. <i>pumilus</i> . . .	Hippeastrum sub-gen. Habranthus (= roseum)	Hippeastrum
20. <i>maculatus</i> . . .		"
21. <i>Andersonianus</i> . . .	Zephyranthes sub-gen. Zephyrites	Habranthus
Var. 1. <i>aurea</i> . . .		
" 2. <i>cuprea</i> . . .		
" 3. <i>obscura</i> . . .		
" 4. <i>brevilimba</i> . . .		
" 5. <i>parvula</i> . . .		
" 6. <i>texana</i> . . .	Zephyranthes proper	Habranthus
22. <i>andicola</i> . . .	" sub-gen. Zephyrites	Hippeastrum

of the genera on p. 72. The text from the latter may be rendered as follows :

" 34. *Habranthus*.—Perianth declinate . . .

" *A. Subbi-plurifloræ*, the upper sepaline filament prolonged.

"B. Uniflorae, the upper sepaline and lower petaline filaments shorter—If constant, a distinct genus. *Zephyrites*? Herbert, to be further investigated."

In the main body of his work HERBERT makes no mention of Zephyrites, nor does his arrangement of the species into sections there follow the arrangement given in the enumeration of the genera. It is obvious, however, that the A. group of the enumeration corresponds to sections 1 and 2 of the above table, and that the B. group—the *Zephyrites*? Herbert—is equivalent to section 3. I cannot suggest any way in which the species *versicolor*, *robustus* and *Andersoni*, from section 3, differ from *gracilifolius*, and *sylvaticus* of section 2, and hence the former are placed with the latter in the genus Habranthus.

There is one further matter to be considered, and that is the position of the plant that HERBERT originally named *Habranthus Andersoni* var. *texanus*, and which BAKER transferred to his "Zephyranthes proper" under the name *Z. texana* Baker, although he had placed *H. Andersoni* in his Hippeastrum sub-genus Zephyrites. From the illustrations that have been published, it is obvious that the var. *texanus* (known only from Texas) is very like *H. Andersoni* (a native of Uruguay), and there is no doubt that this species belongs to Habranthus *sensu stricto*, for the stamens shown in the figure in Bot. Reg., t. 1345, are clearly declinate, fasciculate and unequal, and they are, moreover, obviously so in the specimens in the Kew Herbarium. In the figure of *H. Andersoni* var. *texanus* in the Bot. Mag., t. 3596, on the other hand, the stamens are clearly shown erect and regularly arranged as in a true Zephyranthes, and there can be little doubt that BAKER placed the plant in his Zephyranthes proper on account of this figure. The type material of var. *texanus* is too poor to be of much help in deciding whether the stamens were erect or declinate, although on the whole they seemed to be more declinate than otherwise. Mr. HUME, however, was able to provide photographs and beautifully prepared specimens of the Texas plant, and these leave no doubt that the plant belongs to Habranthus. Presumably the figure of the stamens in the Bot. Mag., t. 3596, is wrong. This var. *texanus* is the only Habranthus to occur outside South America, and Mr. HUME suggests that it may have been introduced into Texas from South America long ago, perhaps by some Spanish missionary, during the period 1690 to 1793, when the Franciscans established twenty-five missions in Texas. The variety is close enough to *H. Andersoni* itself to suggest identity, and since it is extremely unlikely that a species would occur only in two such widely separated areas as Texas and Uruguay, and bearing in mind that all the other species of Habranthus are natives of South America, Mr. HUME's suggestion provides a rational and highly probable explanation of the distribution.

THE GENUS PYROLIRION.

Comparison of figs. 61, 3, 12 and 62, 16 with figs. 61, 1, 6-9 and 62, 14, will show at once how *Pyrolirion* differs from *Zephyranthes*, and a discussion of the characters, in order, is given below.

Spathe.—This in *Pyrolirion*, as in *Zephyranthes* and *Habranthus*, is tubular and sheathing below, but whereas in the last two genera the free portion, although it may be deeply bifid, is a single unilateral structure (see fig. 61, 6-9), in *Pyrolirion* the free part consists of two opposite segments quite free from one another (see fig. 61, 12).

Perianth.—In *Pyrolirion* (fig. 61, 3) the perianth consists of a narrowly cylindrical tube which is markedly dilated at the throat into a much wider campanulate-cylindrical limb formed by the convolute closely adhering lower parts of the segments, whose upper portions are spreading-recurved. The whole perianth is held stiffly erect and the segments do not spread apart in the sunshine, remaining closely adhering in the lower part throughout the whole life of the flower. In *Zephyranthes*, on the other hand (fig. 61, 1), the tube is not marked off in outline from the lower part of the segments, and the perianth is more or less funnel-shaped below with the upper part of the segments spreading to a greater or less extent. The flower is held erect or sub-erect, but opens out widely in sunshine, the segments spreading apart from one another.

Stamens.—These in *Pyrolirion*, as in *Zephyranthes*, are inserted at the top of the perianth-tube. It is generally stated that in *Pyrolirion* the stamens are inserted at the middle of the perianth-tube; in these cases the perianth-tube is evidently taken as the true tube plus the tubular portion formed by the closely convolute lower part of the segments. The stamens are actually inserted at the mouth of the true tube.

Stigma.—In *Pyrolirion* the stigma is deeply trifid and the lobes are conspicuously spatulate, whereas in those species of *Zephyranthes* that have trifid stigmas, the lobes are linear.

The differences between *Pyrolirion* and *Zephyranthes*, therefore, seem quite sufficient to enable us to maintain the former as a genus distinct from the latter.

THE POSITION OF ZEPHYRANTHES CANDIDA.

Before leaving the question of generic limits within this group, there is one further matter that requires notice, namely the position of *Zephyranthes candida* (Lindl.) Herb.

Originally described as *Amaryllis candida* by LINDLEY, this species was transferred to *Zephyranthes* by HERBERT, who placed it in a section by itself apart from all the other species of the genus. HERBERT was evidently doubtful as to the propriety of including the species in the genus at all, for he says :

“ My belief is that this plant belongs to a genus intermediate between *Zephyranthes* and *Cooperia*, though I will not disturb it

till the further species of those genera can be thoroughly examined. . . . I suggest the name *Argyropsis*, if its separation should be established on further investigation, in allusion to its silvering the banks of its native river, and giving name to the Argentine republic. It comes very near, however, to *Z. sessilis*, which forms a link between it and the pedunculated species, and I can only separate it as a section of that genus."

In 1847 ROEMER raised it to generic rank, using HERBERT's suggested name *Argyropsis*; subsequent authors, however, have retained it within *Zephyranthes*. It has recently been suggested that the genus *Argyropsis* ought perhaps to be resuscitated, attention being directed to the nature of the spathe, the *Crocus*-like form of the flowers, the point of attachment and erectness of the anthers, the capitate trilobed stigma, and the erect rush-like perennial leaves. Examining these characters in order, we find as follows:

In *Zephyranthes candida* the spathe is tubular and sheathing below and the free part is a single unilateral structure, just as in the other species of *Zephyranthes*. But whereas in these other species the free part is split open right to the apex on the side next to the flower (this being the split through which the flower emerges from the sheath), in *Z. candida* this split does not go right to the apex and the latter is left narrowly saccate (see fig. 61, 10 and 11). In most *Zephyranthes* the free portion of the spathe is also bifid at the apex (fig. 61, 6 and 7), or split for some distance along the back (fenestrated), (fig. 61, 8), but sometimes the apex is entire (fig. 61, 9). The difference between a spathe of the latter type and the spathe of *Z. candida* is merely one of degree, for if the split in *Z. candida* was continued right to the apex instead of stopping a short distance from it, then the spathe would be exactly as in those *Zephyranthes* where the spathe is entire at the apex.

With regard to the anthers, it is pointed out that in *Z. candida* they are attached near the base and not at the middle as is usual in *Zephyranthes* (note, however, HERBERT's description), and that they are held erect and are not versatile. In some other species of *Zephyranthes*, however, for example *Z. sessilis* and *Z. grandiflora*, the anthers are attached towards the base exactly as in *Z. candida*. Moreover, as the flowers of the latter species age, the perianth-segments open out and spread apart, and the anthers may show a tendency to become versatile, their erectness in the flower in the younger condition being due, in part, to the erectness of the segments and to the fact that the stamens are low down in the flower, and in part to the position of attachment. The capitate trilobed stigma* is certainly not unique in the genus being, in fact, very similar to that found in *Z. citrina* and *Z. macrosiphon*.

The only really effective difference between *Z. candida* and the other species of *Zephyranthes* lies in the leaves, which in *Z. candida* are

* HERBERT's statement, "The erect lobes of its stigma are peculiar to itself" (*Amaryll.* p. 177), is presumably based on the figures he quotes, namely *Bot. Mag.* t. 2607 and *Bot. Reg.*, t. 724. I have never seen the stigma as shown in these plates, and especially in the *Bot. Reg.* In all the material I have seen the stigma has been capitate and trilobed (see fig. 62, 15).

erect, rush-like and perennial, whereas in all the other species they are linear and deciduous, dying back at the end of the growing season when the bulb enters on a period of rest. Striking though this difference is, I am doubtful if it can be regarded as of generic importance, and, on the whole, I think it better to leave the species in *Zephyranthes* until the whole genus has been critically investigated and the relationships of *Z. candida* to the other species are more fully known.

Z. candida is known to be native only along the La Plata River, and it is said that when JUAN DIAZ discovered the river in 1515, the name Rio de la Plata (the Silver River) was given to it because of the abundance of silvery-white flowers of *Z. candida* along its banks. As HERBERT says, the name Argentina is also supposed to have been suggested by the same phenomenon.

Z. candida is well known in cultivation in this country. It is quite hardy, and at Kew it has long been used as an edging for borders, for which purpose it is very satisfactory. During the late summer and autumn it makes a very brave show with its numerous silvery-white flowers, being one of the features of the Gardens at this time of the year.

CONCLUSIONS.

The group as here understood, therefore consists of four genera, *Zephyranthes*, *Pyrolirion*, *Habranthus* and *Hippeastrum*, and diagnoses for each of them, together with lists of the species, are given below.

Mr. HUME has kindly checked the lists for *Zephyranthes* and *Pyrolirion*; those for *Habranthus* and *Hippeastrum* are compilations from existing records. Names already reduced to synonymy are not included. BAKER's Handbook of the Amaryllideae of 1888 has been followed, for the most part, so far as the species dealt with in it are concerned. To them have been added species published since, except in a few instances where such species are known to be synonymous with earlier species. It has not been possible to investigate critically the validity and nomenclature of the species within the genus to which they have been assigned, and of a number of them no material has been available for examination. There is good reason to believe that quite a number of the species listed, especially in *Hippeastrum*, will be found on detailed investigation to be synonymous with other species, and they will eventually have to be reduced. The doubtful species have been retained for the time being, and the lists must be taken as purely tentative so far as the validity of the species and the nomenclature are concerned. So far as the critical investigation of the species of *Zephyranthes*, *Pyrolirion* and *Habranthus* are concerned, Mr. HUME has already covered a good deal of the ground, and it is hoped that his account of them will appear this year.

DIAGNOSES OF THE GENERA AND LISTS OF SPECIES.

I. ZEPHYRANTHES Herb. (*Zephyranthes* proper of Baker: *Zephyranthes* sub-genus *Eusephyranthes* Holmb.). *Spathe* tubular and sheathing below, upwards free, unilateral and usually bifid (fig. 61, 6 and 7), but sometimes partially split

("fenestrated," fig. 61, 8) and occasionally entire (fig. 61, 9); *peduncle* one-flowered; *bracts* usually absent, rarely one present; *flower* erect to sub-erect; *perianth* more or less funnel-shaped below with the segments spreading upwards, tube very short and not marked off in outline from the lower part of the segments (fig. 61, 1), segments sub-similar, the three outer slightly wider than the three inner; *stamens* erect, diverging, regularly arranged in two sets of three each, three longer alternating with three shorter (fig. 62, 14 and 15); *stigma* trifid with the segments linear, or capitate and trilobed.

This genus covers two areas: (1) Central America, from the southern United States to northern South America, including the West Indies, and (2) the southern part of South America—south Brazil, Paraguay, Argentina, Uruguay and Chile.

- Z. arenicola* Brand. Lower California.
- Z. Atamasca* (L.) Herb. South-eastern United States.
- Z. Bakeriana* Morong. Paraguay.
- Z. bifolia* (Aubl.) Roem. West Indies.
- Z. brevipes* Stand. Guatemala.
- Z. candida* (Lindl.) Herb. Argentina.
- Z. cearensis* (Herb.) Baker. Brazil.
- Z. citrina* Baker. Guiana?, West Indies.
- Z. Commersoniana* Herb. Uruguay.
- Z. concolor* Lindl. Mexico.
- Z. Conzattii* Greenm. Mexico.
- Z. depauperata* (Poepp.) Herb. Chile.
- Z. entreriana* (Hoffm.) Pax. Argentina.
- Z. erubescens* S. Wats. Mexico.
- Z. filifolia* Herb. ex Kränzlin. Patagonia.
- Z. franciscana* Herb. ex Baker. Brazil.
- Z. gracilis* Herb. Peru.
- Z. grandiflora* Lindl. West Indies, Guatemala.
- Z. lactea* Moore. Brazil.
- Z. lilacina* Liebm. Hab.?
- Z. Lindleyana* Herb. Mexico, Guatemala?
- Z. longifolia* Hemsl. Texas, Mexico, Arizona, New Mexico.
- Z. longistyla* Pax. Argentina.
- Z. macrosiphon* Baker. Mexico.
- Z. mesochloa* Herb. Argentina, Uruguay, Paraguay.
- Z. minima* Herb. Argentina, Uruguay.
- Z. oxylepala* Speg. Argentina.
- Z. Nelsonii* Greenm. Mexico.
- Z. pulchella* J. D. Sm. Texas.
- Z. rosea* Lindl. West Indies, Guatemala.
- Z. Simpsoni* Chapman. Florida.
- Z. stenopetala* Baker. Uruguay.
- Z. tepicensis* Greenm. (ms.). Mexico.
- Z. Treatiae* S. Wats. Florida to Georgia.
- Z. tubispatha* Herb. West Indies.
- Z. verecunda* Herb. Mexico.

To this genus *Atamasco microcarpa* Rusby (Bolivia) may also be referable, but the existing material is not good enough for a decision to be come to.

II. PYROLIRION Herb. (*Zephyranthes* sub-genus *Pyrolirion* Baker *).

Spathes tubular and sheathing below, upwards with two free opposite segments (fig. 61, 12); *peduncle* one-flowered; *bracts* none; *flower* stiffly erect; *perianth* consisting of a comparatively long narrowly cylindrical tube, which is markedly dilated at the top into the much wider cylindrical-campanulate limb formed by the convolute closely adhering lower part of the segments, the upper part of the segments being spreading-recurved (fig. 61, 3), segments sub-equal; *stamens* erect to sub-erect, regularly arranged, sub-equal; *stigma* deeply trifid, the segments markedly spatulate.

So far as we know, this genus is confined to the Andes of Bolivia and Peru.

- P. aurantiacum* Lem. Peru (= *aureum*?).
- P. aureum* (Ruiz and Pavon) Herb. Peru.
- P. boliviense* (Baker) Sealy. *Comb. nov.* (syn. *Zephyranthes boliviensis* Baker, Handb. Amaryll. 38 (1888)). Bolivia.

* *Pyrolirion albicans* Herb., which BAKER placed in his *Zephyranthes* sub-gen. *Pyrolirion*, is now referred to *Cooperia* as *C. albicans* (Herb.) Sprague.

P. flammeum (Ruiz and Pavon) Herb. Peru.

P. xiphopetalum (Baker) Sealy. **Comb. nov.** (syn. *Zephyranthes xiphopetala* Baker, in Mem. Torrey Bot. Club IV., 268 (1896). Bolivia.

The following may also be referable to this genus, but no authentic material has been available for examination :

Zephyranthes Beustii Schinz. Peru (= *aurantiacum* ?).

„ *Briquetii* Macbride. Peru.

parvula Killip. Peru.

pseudocolchicum Kränzl. Bolivia.

III. HABRANTHUS Herb. (*Zephyranthes* sub-genus *Zephyrites* Baker pro parte maxima).

Spathe tubular and sheathing below, upwards free, unilateral and usually bifid but sometimes only partially split along the back and occasionally entire (fig. 61, 6 to 9); *peduncle* normally one-flowered, sometimes two-flowered, very rarely up to four-flowered (?); *bracts* sometimes present, sometimes absent; *flower* oblique to declinate; *perianth-tube* short; *segments* sub-similar (?) or of four different sizes; *stamens* declinate, fasciculate, unequal, of four different lengths (fig. 62, 17); *stigma* trifold, or capitate and trilobed.

Confined to temperate South America, Argentina, Uruguay, and the neighbouring parts of Paraguay and Brazil.

H. Andersoni Herb. ex Lindl. Uruguay, Argentina, and ? Brazil.

H. brachyandrus (Baker) Sealy. **Comb. nov.** (syn. *Hippeastrum brachyandrum* Baker, Handb. Amaryll. 42 (1888)). Paraguay.

H. cardinalis (C. H. Wright) Sealy. **Comb. nov.** (syn. *Zephyranthes cardinalis* C. H. Wright, in Bot. Mag. t. 8553 (1914)). Hab. ? an hybrida (?)

H. gracilifolius Herb. Uruguay.

H. longipes (Baker) Sealy. **Comb. nov.** (syn. *Zephyranthes longipes* Baker, in Kew Bull. 1898, p. 225). Uruguay.

H. mendocensis (Baker) Sealy. **Comb. nov.** (syn. *Zephyranthes mendocensis* Baker, Handb. Amaryll. 36, 1888). Argentina.

H. pedunculatus Herb. Argentina, ? Paraguay.

H. robustus Herb. Argentina.

H. sylvaticus (Mart. ex Schultes) Herb. Brazil.

H. versicolor Herb. Uruguay, ? Brazil.

The following species also appear to be referable to Habranthus, but authentic material has not been seen :

Amaryllis caerulea Griseb. (*Zephyranthes caerulea* Baker). Brazil, Uruguay.

Hippeastrum Holmbergii Hicken. Argentina.

Zephyranthes jujuyensis Holmberg. Argentina.

„ *lilacina* Speg. (non Liebm.). Argentina.

„ *melanopotamica* Speg. Argentina.

„ *porphyrospila* Holmberg. Argentina.

Hippeastrum teretifolium C. H. Wright. Uruguay.

Zephyranthes timida Holmberg. Argentina.

Zephyranthella tubispatha Pax (syn. *Hippeastrum tubispathum* Pax). Argentina.

IV. HIPPEASTRUM Herb.

Spathe of two equal and opposite valves which are simple and quite free from one another to the base (fig. 61, 13); *peduncle* two- to several-flowered, rarely one-flowered by reduction; *bracts* always present, each flower subtended by a bract; *flowers* declinate; *perianth-segments* of four different sizes; *stamens* declinate, fasciculate, unequal, of four different lengths; *stigma* capitate or trifold.

With the exception of *H. equestre*, found in the West Indies (in addition to Brazil, Guiana, Colombia, Venezuela, Bolivia and Peru), all the species are native to South America.

H. advenum (Gawl.) Herb. Chile.

H. ananuca Phil. Chile.

H. andicola (Poepp.) Baker. Chile.

H. Andreanum Baker. Colombia.

H. angustifolium Phil. Chile.

H. angustifolium Pax. Argentina.

H. araucanum Phil. Chile.

H. aulicum (Gawl.) Herb. Brazil, Paraguay.

H. Bagnoldi (Herb.). Baker. Argentina, Chile.

H. Bakeri Phil. Chile.

H. Berteroanum (Phil.) Baker. Chile.

- H. bicolor* (Ruiz and Pavon) Baker. Chile.
H. bifidum (Herb.) Baker. Uruguay, Argentina.
H. bonariense O. Kuntze. Argentina.
H. breviflorum Herb. Argentina.
H. calyptratum (Gawl.) Herb. Brazil.
H. candidum Stapf. Argentina.
H. Canterai Arech. Uruguay.
H. chilense (Ruiz and Pavon) Baker. Chile.
H. colonum Phil. Chile.
H. consobrinum Phil. Chile.
H. crociflorum Rusby. Bolivia.
H. cybister (Herb.) Benth. and Hook. f. Bolivia.
H. Damazianum Beauverd. Brazil.
H. Elwesii C. H. Wright. Argentina.
H. equestre (Ait.) Herb. West Indies, Guiana, Brazil, Colombia, Venezuela, Bolivia and Peru.
H. flammigerum Holmb. Argentina.
H. Forgetii Worsley. Peru.
H. fuscum Kränzl. Peru.
H. Gayanum O. Kuntze. Chile.
H. gladioloides (Hieron.) Pax. Argentina.
H. granatiferum Holmb. Uruguay.
H. Harrisoni (Bury) Hook. f. Uruguay.
H. Herbertianum (Lindl.) Baker. Chile.
H. iguapense R. Wagner. Brazil.
H. Jamesoni Baker. Argentina.
H. laetum Phil. Chile.
H. Leopoldi Dombroin. Peru.
H. lineatum (Phil.) Baker. Chile.
H. Mandoni Baker. Bolivia.
H. marginatum Fries. Argentina.
H. miniatum (Ruiz and Pavon) Herb. Peru.
H. modestum (Phil.) Baker. Chile.
H. Moelleri Phil. Chile.
H. montanum (Phil.) Baker. Chile.
H. organense Hook. Brazil.
H. pardinum d'Ombrain (1867) et (Hook. f.) Lem. (1867). Peru.
H. petiolatum Pax. Argentina.
H. phycelloides (Herb.) Baker. Chile.
H. popetanum Phil. Chile.
H. pratense (Poepp.) Baker. Chile.
H. procerum (Duchartre) Len. Brazil.
H. pronum C. Koch. Venezuela.
H. psittacinum (Gawl.) Herb. Brazil.
H. purpuratum Phil. Chile.
H. Reginae (L.) Herb. Brazil.
H. reticulatum (L. Herit.) Herb. Brazil.
H. Rhodolirion Baker. Chile.
H. roseum (Sweet) Baker. Chile.
H. rutilum (Gawl.) Herb. Brazil, Venezuela.
H. scopulorum Baker. Bolivia.
H. solandriiflorum (Lindl.) Herb. Guiana, Brazil, Paraguay, Colombia, Venezuela.
H. Solisi Phil. Chile.
H. soratense Baker. Bolivia.
H. splendens Phil. Chile.
H. stenopetalum A. Dietr. Peru.
H. stylosum (Bury) Herb. Guiana, Brazil.
H. tenuiflorum Phil. Chile.
H. tucumanum Holmb. Argentina.
H. uniflorum Baker. Chile.
H. uniflorum (Arech.) Herter. Uruguay.
H. viridiflorum Rusby. Bolivia.
H. vittatum (L'Herit.) Herb. Peru.
H. Warszewiczianum A. Dietr. Bolivia.

To this genus would seem also to be referable *Griffinia Blumenaria* C. Koch et Bouché ex Carr.—a species which is probably identical with *Hippeastrum iguapense* R. Wagner.

CONTRIBUTIONS FROM THE WISLEY LABORATORY.

LXXX.—A LEAF-HOPPER (JASSID) ON RHODODENDRON.

By G. FOX WILSON, N.D.H., F.R.E.S., F.L.S., Entomologist.

It seems desirable to draw the attention of all who grow Rhododendrons, Kalmias and allied plants to a North American species of Leaf-hopper or Jassid, *Graphocephala coccinea* Forster, which has recently appeared in this country.

This species, which occurs throughout the eastern half of the United States and extends into the Canadian Provinces of Quebec and Ontario (CHINA*), has by some means been introduced into this country, where it has become well established in some Surrey gardens.

It is to be hoped that all growers of Rhododendrons will search during the spring and summer to ascertain whether this Leaf-hopper has reached their plantations and, in cases of doubt, submit specimens, which will be willingly examined in the Society's laboratory.

This striking insect with gaily coloured forewings was first collected in 1933 on Rhododendrons at Chobham by Mr. L. F. BARTON, who later sent the specimen to the British Museum (Natural History), where it was identified as a North American species by Mr. W. E. CHINA (*l.c.*). Mr. BARTON again met with this conspicuous Homopteron in great abundance on Rhododendrons in a plantation near Chobham in 1936,† and through his kindness I was shown the infested plantation towards the end of September 1936, in company with Mr. C. T. GIMINGHAM of the Plant Pathological Laboratory, Harpenden, Herts. The winged adults were found congregating in vast numbers on the leaves of Rhododendron bushes and, to a far less extent, on some Kalmia bushes. There was a marked absence of any injury on the leaves as a result of the piercing of the cell walls by the sucking mouth-parts of the insect even on leaves upon which nymphal moult-skins were found attached by their stylets, showing that they had been feeding on the foliage.

Towards the end of the 1936 season it was ascertained that this Leaf-hopper is firmly established in several gardens in Surrey, namely at Chobham (2), Windlesham (2), and Woking (2). Visits were paid to the districts between September 23 and October 1, when swarms of the Jassid were found on Rhododendron bushes in these areas.

I am indebted to Mr. GOMER WATERER for drawing my attention to an infestation on Rhododendrons at Windlesham Moor, where, he states in a letter (October 5, 1936), "All the men recognize it and

* Entomologist's Monthly Mag., 1935, vol. 71, pp. 277-279.

† *Ibid.*, 1936, vol. 72, p. 209.

remember it for certainly the last four or five years. They call it the 'Grasshopper fly'."

Owing to the extensive injury committed by other species of Leaf-hopper, e.g. the Rose Leaf-hopper (*Typhlocyba rosae* Linn.), the Oak and Fruit Leaf-hopper (*T. quercus* Fabr.), and the Yellow Leaf-hoppers (*Chlorita flavescens* Fabr. and *C. viridula* Fall.), it was thought well to ascertain the views of American and Canadian workers concerning the economic importance of this species.

OSBORN,* in his review of the "Leaf-hoppers of Maine," states, "While quite abundant, observations so far have not indicated serious attacks upon any cultivated crop."

Dr. A. GIBSON, Dominion Entomologist, Canada, kindly sent the following information (letter November 5, 1936): "Regarding the species, *Graphocephala coccinea* Forst., this is not a pest of any importance in Canada. It is quite common in our eastern provinces from Manitoba to Nova Scotia, and has been collected by our officers on a number of plants, but in no case, as far as we know, has it done any appreciable damage."

Such information is reassuring, though it does not necessarily follow that this introduced species will prove equally innocuous in this country, and it is desirable that all who harbour this Leaf-hopper in their gardens will keep a watchful eye on their plants and report at once the occurrence of any injury.

Host Plants.—The number of recorded host plants in the United States and Canada is considerable. OSBORN † states that the species is far more common in woody localities, and is to be swept from the undergrowth of grass and weeds. It appears, however, to occur in localities where grass is largely predominant, and it seems certain that the grasses constitute a part of its food supply.

OSBORN again refers to it in his paper on the "Leaf-hoppers of Maine" (*l.c.*), and says that it is taken also on a number of plants, as Viburnum, Poplar, Strawberry, and especially in damp woods on Ferns, where the larvæ are also abundant in midsummer.

E. H. GIBSON ‡ records it in the Central Mississippi Valley States as feeding on a great variety of plants, including over fifty species of weeds, grasses, on many ornamental plants and shrubs, and various trees, including Magnolia. It was the only species found to feed on the leaves of American Holly.

PATCH § collected it from Potatoes on August 6, 1921, in Maine.

So far as our observations go, this Leaf-hopper is confined in this country almost entirely to Rhododendrons, with the exception of a few individuals on some plants of Kalmia at Chobham.

Description.—The adult insect has been described by CHINA (*l.c.*). The head is bright yellow, the eyes and a broad band round the

* U.S. Dept. Agric. Bur. Entom., Bull. 108, 1912, p. 60.

† Maine Agric. Exp. Stat., Bull. 238, 1915, p. 101.

‡ Canadian Entomologist, 1916, vol. 48, p. 178.

§ Jour. Econ. Entom., 1922, vol. 15, pp. 372-373.

anterior margin being black. The fore-part of the thorax (pronotum) is bright bluish-green, with the anterior margin yellow and with two reddish spots on the green area. The first pair of wings (tegmina) are bright bluish-green with two scarlet stripes—the costal margin and veins being yellow (fig. 63). The apical margin of the forewings is fuscous, while the hind-wings are black. The legs, together with the scutellum, are yellow. The abdomen is scarlet above and yellow beneath, while the ovipositor of the female is black. Some variation occurs both as regards size and colour pattern of the spots on the pronotum and the scarlet stripes on the forewings. Length of body, 5–6 mm. ; width across forewings, 15 mm.

Life History.—The life history of this Leaf-hopper in this country is so far unknown, and observations are being made to ascertain whether the cycle described by American authors agrees with that occurring in this country.

According to OSBORN (1912, *l.c.*), there are two generations in the year. The nymphs of the first generation occur during May and June, those of the second from late June until late August. The adults of the first generation occur from mid-June to late July, while those of the second are found during September and October. The winter is said to be passed in the egg stage, but we have so far failed to induce this Leaf-hopper to oviposit under laboratory conditions.

GIBSON (*l.c.*) states that the adults remain almost inactive during the daytime, and that they are attracted to lights at night.

We found the adults swarming on the upper surface of *Rhododendron* leaves in Surrey gardens during late September and early October. They were not particularly active except when the bush on which they were resting was shaken, when, after taking a flying leap into the air, they made use of their wings and flew a few feet, but speedily resettled on the leaves of the same or neighbouring plants.

Effect on Plants.—The injury committed by Leaf-hoppers is generally very marked owing to the piercing of the leaves by their mouth-parts and the abstraction of the cell contents by the stylets, resulting in mottled and bleached areas.

It was surprising, therefore, to find no apparent damage on the *Rhododendron* leaves upon which the insects were swarming in large numbers, and where numerous nymphal moult-skins were found attached by their stylets.

Some injury was, however, found on some plants of *Rhododendron discolor* in a Windlesham garden, and extensive spotting of the foliage was apparent (fig. 64). An examination of the affected leaves showed that the stylets of the nymphal moult-skins were still inserted in the tissues, and that an invasion of a bacterial organism had occurred through the feeding lesions. It is puzzling to account for the damage on these particular plants, for no other cases of injury were discovered in the large collection of hybrid and species *Rhododendrons* which are growing in this garden irrespective of the fact that the Leaf-hoppers were swarming on a number of plants scattered over a wide area.

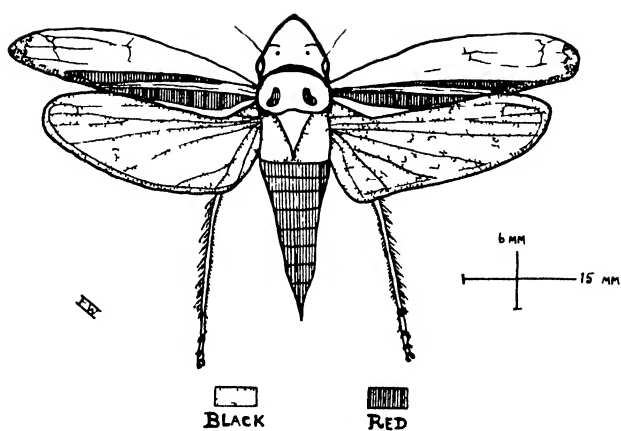


FIG. 63 ADULT LEAF HOPPER *GKATHOCLEPTALIA COCCINEA*

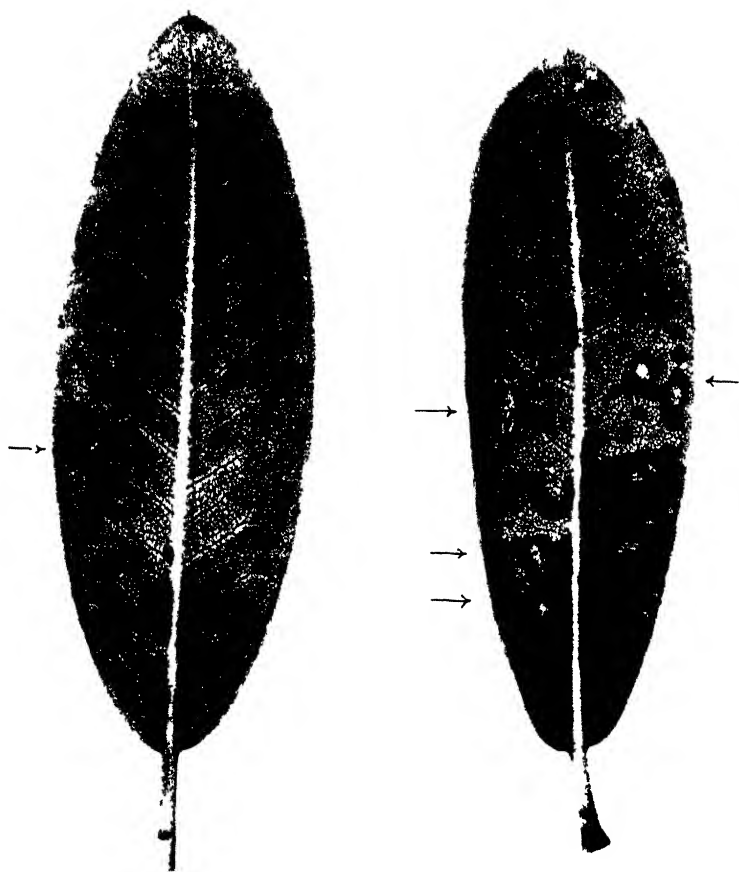


FIG. 64 LEAVES OF RHODODENDRON DISCOLOR WITH MOULT SKINS OF LARVAL HOPPER *GRAPHOCITHA COCCINEA* SHOWING DISTASTED AREAS AROUND THE FEEDING FUNCTURES



FIG 65 —HATH GARDIN AT WISLA IN SEPTEMBER



FIG 60 KORFAN CHRYSANTHEMUMS

To Jace p 213

The invasion of secondary agents (bacterial and fungal organisms) through the feeding lesions of this insect may well prove to be more serious than the effects of the feeding of the insect itself.

KUNKEL * in his studies on Aster Yellows states that this Leaf-hopper was transferred from diseased plants to healthy young plants in insect-proof cages, and in all cases negative results were obtained, the conclusion being that this insect is not a vector of the disease. KUNKEL stated later,† “The beautiful leaf-hopper, *Graphocephala coccinea*, occurs in small numbers on the Aster and does not readily transmit the disease (namely Aster Yellows).”

Control.—While our knowledge of the injury committed by this insect in this country is still obscure and its presence in gardens may not call for any remedial measures, it is desirable to add that owing to the marked agility of the adult hoppers it would appear that the application of a Nicotine dust is more effective than a wet spray, for the penetrative power of a dust allows the hoppers to be killed in dense bushes, the leaves of which are extremely difficult to wet with a spray fluid.

Acknowledgments.—My sincere thanks are due to Mr. L. F. BARTON for conducting me to the outbreak whence he obtained the original specimens, and to my colleague, Mr. F. C. BROWN, for the photographs illustrating this note.

* Phytopathology, 1924, vol. 14, p. 54.

† American Jour. Botany, 1926, vol. 13, p. 653.

CONTRIBUTIONS FROM THE WISLEY LABORATORY.

LXXXI.—ANTIRRHINUM RUST III.—RUST-RESISTANT STRAINS OF ANTIRRHINUMS.

By D. E. GREEN, M.Sc., Mycologist.

DURING the past three years careful observation of Antirrhinum Rust (*Puccinia Antirrhini*) has shown that since its first appearance in this country in 1933 the disease has continued to spread and cause a varying amount of damage each season. The most severe attack at Wisley was in the summer of 1934 when plants there and in many other localities were killed by it early in the season (July). Since then, each year the reports of its presence are sufficiently numerous to show that it overwinters successfully and undoubtedly is present over most of Great Britain.

This disease, serious in America for some years, but previous to 1933 not recognized in Europe, is now well known over the greater part of the continent. Whatever may be the reason for its severity on our Antirrhinum plants in 1934, it seems reasonable to suppose that another summer providing similar conditions may result in an outbreak far more serious in its effects, since the fungus is now so widespread.

As soon as the disease was known to be spreading rapidly, the Society planned an investigation to find what measures could be taken to check the trouble, and it was decided to consider the following possibilities :

1. The use of fungicides in checking the disease.
2. The breeding of strains of Antirrhinums resistant to the rust.

A test of the efficiency of different fungicides (12 in number) has already been carried out, and the results and conclusions have been published in the R.H.S. JOURNAL.* The results showed that the disease was checked only by repeated applications (6 to 8 in a season) of fresh home-made Bordeaux or Burgundy mixture, and it was concluded that control with fungicides was likely to prove a matter of difficulty. This is not surprising, as in America under certain climatic conditions this rust, out of doors, is regarded as uncontrollable. It was felt that the possibility of breeding plants resistant to the rust should be further investigated, and the present paper deals with the progress so far attained in this direction.

* GREEN, D. E. "Antirrhinum Rust: The results of spraying and dusting with Fungicides." JOURNAL R.H.S. 61, p. 64 (1936).

ORIGIN OF THE PLANTS USED.

American investigators have carried out much work on this disease, and during the last five years have produced strains of *Antirrhinums* claimed to possess resistance to rust. Early in 1934 the Society commenced inquiries with a view to obtaining some seed of these resistant strains, and, through the kind offices of Sir DANIEL HALL, a small quantity was obtained in that summer. The plants raised did not flower, but were sprayed with rust spores three times without result and were carried on into 1935.

These plants were augmented by others raised from further samples of American seed so that in 1935 about 550 were grown next to some 4,000 badly infected plants contained in the fungicidal spray trial. Despite the fact that three separate attempts were made to infect them all with the disease artificially, and that these resistant strains must have been subject to a continual drift of infective spores for four months, 77 per cent. remained free from infection at the end of the season. At this date most of the plants of the susceptible variety (Malmaison) used in the adjoining fungicidal trial had been killed by the disease. The contrast between the healthy resistant plants (which had received no protective spray or preventive treatment of any kind) and the brown shrivelled dead plants of the susceptible variety was very marked.

Characters of the resistant plants (1935).—The resistant plants were very mixed in type. The foliage varied from light to very dark glossy green, and the leaves from thin and narrow types to large and broad ones. In habit there were slender-stemmed, loose-spreading plants, but also compact and well-shaped ones. In height dwarf, intermediate, and tall types were all present. The flowers and flowering spikes varied widely in habit and colour—most were of magenta shades and none was of outstanding quality. All plants which contracted the least sign of rust were destroyed, but from those which remained rust-free a number showing good habit and the best flowers were selfed under cages and the seed collected.

1936 Planting.—In 1936 the seeds sown were (1) those obtained from the plants which had resisted attack and were selfed in 1935 at Wisley and (2) a number of strains sent by growers interested in the problem. The seeds received from the growers were also of American origin except that 12 ordinary strains were also sent and these last served as a useful comparison with the American strains for rust resistance. In the Wisley 1935 selfed plants, out of 30 samples of seed 6 proved to be infertile and did not germinate. Some of the others gave poor germination, so that certain strains contained very few plants. The plants were planted in rows of 20, distances being 2 feet between rows, and the plants 1 foot apart in the rows. Frequent rain helped considerably in establishing the plants and encouraging growth.

The ground occupied by the plants was that on which the badly affected ones had grown the previous season. Nevertheless up to the beginning of August no sign of rust had been seen on the trial ground, and each plant was therefore sprayed on August 8 with a heavy suspension of rust uredospores. Rust pustules were observed on a few plants on August 18, but further spores were placed on each plant (this time by hand) on August 21. Despite this it was evident that the seasonal conditions were not favourable to the rust, for no great spread could be seen for some weeks even among susceptible varieties, although these had been infected along with the others. This fact was disturbing because it delayed identification of resistant stocks for seed collection. Flower spikes on about 100 plants had been bagged at the first flowering, but rust appeared on the majority of these, so that the plants had to be rejected. In many cases the bags had again to be removed, and by the time rust was becoming evenly distributed among the plots it was late in the season, which, in any case, was wet and unfavourable for the production of good seed from protected spikes. The disease in fact did not develop to any great extent until the second week in September, when it definitely commenced to increase. At no time did it become serious and kill the plants rapidly as it did in 1934 and, to a less extent, even in 1935. Certain plants were severely attacked, but the greater number did not exhibit obvious signs of disease, and to the untrained eye appeared healthy. This made the final examination much more difficult as most plants required to be pulled up for their foliage to be closely examined for rust. The stocks claiming resistance were naturally subjected to meticulous examination.

Final data were collected when each plant was lifted for examination in the third week in October. Some stocks had been reduced in number by death from causes other than rust. None of the stocks containing a small number of plants was of very good quality, and those showing any rust infection have been discarded. Where a small stock was completely free from rust the result was not accepted as a sufficiently reliable guarantee of high resistance, but seed was collected for a further test. In all about 3,500 plants from stocks claiming rust resistance have been grown and observed during the season. As previously stated, these were composed of (1) the progeny of selfed plants grown from American seed in 1934 and 1935, and proved rust-resistant for these years, (2) plants raised from seed of recently marketed American rust-resistant varieties. The results from each class will be discussed separately.

(1) *The progeny of plants which had been raised from American seed in 1934 and 1935 and selfed at Wisley.*—The number of parent plants selfed in 1935 was 30, but, as already mentioned, 6 samples of seed were infertile, and from various causes other stocks were reduced in number. On the other hand, some stocks yielded a high number of seedlings and one contained 500 plants on trial. No stock with less than 20 plants was included when recording the resistance shown.

All stocks displayed a high degree of resistance varying from 61 per cent. to 100 per cent. The latter figure was recorded for two stocks, viz. : Nos. 3 and 12, containing 145 and 62 plants respectively, none of which showed the slightest sign of rust. No. 12 stock contained a mixture of plants with moderately good colours, but was not very true in habit. No. 3, however, was level both in habit and colour, but its leaves tended to the narrow type and the flowers were of a magenta shade. Both these stocks were of the intermediate type.

(2) *Plants raised from the seeds of American origin sent in by growers.*—Several of these American stocks bore similar names, and from the growth and colour characters there was no doubt that they were of the same origin. With one exception, all showed high resistance to rust during the season. The exception, although claimed to be 90 per cent. resistant, became quite the worst infected of all and was only 57 per cent. resistant in this trial. Resistance among the others varied from 77 per cent. to 100 per cent., eight being entirely free from rust ; two of these were undoubtedly the same, so there were seven rust-free stocks. Three of these seven stocks had duplicates in the trial containing susceptible plants. Assuming similar stocks to be of the same origin, there were therefore only four American stocks that could be considered entirely free from rust.

It is interesting to note that although the 12 ordinary varieties did not look infected (and in fact were not badly infected) a careful scrutiny revealed the following amount of infection :

1 stock 38 per cent. infected, i.e. 62 per cent. resistant							
I	"	40	"	"	"	60	"
I	"	43	"	"	"	57	"
I	"	49	"	"	"	51	"
I	"	70	"	"	"	30	"
I	"	90	"	"	"	10	"
I	"	95	"	"	"	5	"
5 stocks	100	"	"	"	"	No resistance	

The highest resistance in the ordinary varieties was therefore exceeded by all the resistant varieties except one.

From these results, and from information kindly sent in by other workers who have tried resistant plants on a smaller scale, it seems clear that certain *Antirrhinums* possess resistance to attack by *Puccinia Antirrhini*. The plants owe their origin to American scientific workers notably MAINS* and EMSWELLER and JONES.† MAINS in Indiana as early as 1922 was interested in two plants in his garden which survived severe attacks although they became moderately rusted. These he self-pollinated and observed the progenies, from which he made fresh selections.

* MAINS, E. B. "Rust Resistance in *Antirrhinums*." *Phytopathology*, Nov. 1935, vol. 25, no. 11, p. 977.

† EMSWELLER, S. L., and JONES, H. A. "The Inheritance of Resistance to Rust in the Snapdragon." *Hilgardia*, June 1934, vol. 8, no. 7, p. 197.

Up to 1929, EMSWELLER and JONES, despite diligent search on the large Californian flower seed farms, had failed to find a single plant showing resistance. In 1930, among other plantings, they included some plants raised from seed supplied by MAINS from his selected stocks. These plants showed a high resistance, although none was quite free, but from some of them EMSWELLER and JONES harvested seed that in 1931 gave several plants which remained entirely free from rust, and these provided the starting point of their subsequent experiments in breeding and selection for resistance.

Early in the work the results obtained by selfing resistant plants and by back-crossing them with susceptible commercial varieties indicated that the resistance was controlled by a single dominant gene. The resistant plants were of two types, one homozygous for resistance and the other heterozygous. All the lines that were homozygous for resistance were undesirable for commercial purposes, and subsequent work has been directed towards improving these in colour and habit.

The method used was first to cross the homozygous resistant plant with a good (but susceptible) commercial variety; this yielded all resistant (but heterozygous) plants which were then back-crossed with the susceptible parent. The resulting plants segregated into about equal numbers of resistant and susceptible plants. The susceptible ones were discarded, but selected resistant ones in each generation were back-crossed with the good quality susceptible parent until improvement in flower characters was achieved. The best were then selfed, when the progeny segregated approximately into the ratio 3 resistant to 1 susceptible. Large numbers of these resistant plants then being selfed, the progeny indicated those lines homozygous for resistance and these provided a starting point for further work. EMSWELLER and JONES state that if the susceptible parent is as nearly homozygous as possible for colour and type, then resistant plants of a good strain ought to be produced with 3 to 5 back-crosses.

The three American workers mentioned have also done much work in testing *Antirrhinum* species for rust resistance.

They have found high resistance in several species and have used selected strains of *Antirrhinum glutinosum* and *A. Ibanjezii* in crosses with their resistant strains of commercial varieties. The cross with *A. glutinosum* has been much utilized in the work of developing high resistance in commercial types of *Antirrhinum*. Another point of interest was that both selected species, when crossed with susceptible varieties, gave results which indicated that resistance in their case also was due to a simple dominant factor.

The plants now being used at Wisley are derived from this American work, but, although improvement from the original types has no doubt been made, it must be said that these resistant types are still inferior to our ordinary varieties. The improvement of the flower and other commercially desirable characters will no doubt continue, but it must always be remembered that the most important character required is that of resistance to rust.

At Wisley in 1925 the tall resistant varieties were the most nearly true for colour and habit, but there was a good deal of variation in the type of leaf. Nevertheless it seemed to the writer that the tall types were the most reliable according to the description sent with the seed. The smaller types were not so level in colours. The majority were not of good colours, there was a preponderance of magenta shades, and a few varieties possessed mottled flowers.

It must, however, be mentioned that there were stocks that showed promise both in size and colour of flower, and in the close arrangement of the flower on the spike. On the whole the intermediate types were level in habit, and some were good in their arrangement of the flower spikes and method of flowering. It is very noticeable that the highly resistant stocks generally have leaves which tend to be narrow, long, and rather pointed. The Wisley No. 3 stock, so far entirely free from rust, shows this tendency, but is nevertheless not unattractive in habit although possessing a poor flower.

It will be seen that the work in improving the flower characters in rust-resistant strains of *Antirrhinum* has only been in progress for about three years, all previous work being directed towards first securing plants resistant to rust without regard to the quality of their flowers.

It was a disappointing feature in this year's trial that one of the American varieties sent in, although claimed to be 90 per cent. resistant, became so infected as to record only 57 per cent. resistance (43 per cent. being infected). Such a result is difficult to explain. The possibility of resistance breaking down, especially if attacked by a new strain of the rust fungus, has not been overlooked, but if such a position arose it would seem more desirable to continue the search for plants still resistant than to continue to rely on any preventive methods, none of which have as yet proved satisfactory.

It is therefore highly desirable that the possibilities of combining good quality floral characters with rust resistance should be explored thoroughly.

The author's thanks are due to Miss D. ASHWORTH for valuable assistance during the trial.

HARDY HYBRID KOREAN CHRYSANTHEMUMS.

By BEN WELLS, F.L.S.

A NEW introduction among hardy border plants is always a matter of some importance and interest, and the appearance last year of the new Hardy Hybrid Korean Chrysanthemums (fig. 66) is no exception to the rule.

Some fifteen years ago experiments were made in hybridizing *Chrysanthemum coreanum*, a rugged, hardy species native to Korea and Siberia, with *C. indicum*—the prototype of many of our garden Chrysanthemums of to-day. Extraordinary and happy results were obtained, for the hybrid Koreans have inherited the hardiness and vigour of *C. coreanum*, making them hardy herbaceous perennial border plants in the true sense of the word.

Whilst the original crosses were made in America, some thirty varieties have now been tested in this country and have been subjected to extreme weather tests for the past four years, and there is no doubt whatever that their hardiness in this country is proved beyond question.

They grow to a height of $2\frac{1}{2}$ to 3 feet and have an elegant branching habit which resembles that of *Aster Amellus*. They are sturdy and robust in growth, each plant producing dozens of flowers in heads 2 to $2\frac{1}{2}$ feet through in a single season. Their colourings are unusual—in fact they bear the shades of summer rather than those of autumn flowering plants. There are six named varieties, 'Apollo,' 'Ceres,' 'Daphne,' 'Diana,' 'Mars' and 'Mercury,' which are available for planting this season, and their colours should satisfy all tastes, ranging as they do from yellow, golden bronze, pink through salmon to deep wine red.

The Korean hybrids flower from mid-September to well into November, with slight variation according to variety. The spreading bushy habit suggests their use in bold groups in borders, or in beds by themselves, or for massed effects.

Planted in conjunction with other hardy herbaceous perennial autumn flowers, such as Michaelmas Daisies, Heleniums, etc., they will produce effective results, as well as lengthening the flowering season of the border.

As cut flowers there are few plants which can compare with them, for they will remain perfectly fresh for two weeks if cut and placed in vases.

They are not at all fastidious as to soil and situation—given a sunny spot in any ordinary well-prepared garden soil, they will flourish and well repay the time and labour spent in planting.

Experience has proved that no autumn herbaceous border is complete without its quota of outdoor Chrysanthemums, and while the older favourites will continue to find a place, the introduction of these Korean hybrids, owing to their hardiness, free-flowering propensity and ease of cultivation, will constitute a serious menace to the monopoly of popularity which the present outdoor Chrysanthemum has so long enjoyed.

PLANTS TO WHICH AWARDS HAVE BEEN MADE.

Acacia prominens. A.M. March 9, 1937. From Lionel de Rothschild, Esq., Exbury, Southampton. This very beautiful shrub for the cool greenhouse is of erect growth and copiously branched, each lateral carrying numerous narrow, glaucous phyllodes $1\frac{1}{2}$ inch long, in the axils of which arise racemes of golden flowers. The flowers are strongly and sweetly scented. The species is a native of New South Wales, and was figured in the Botanical Magazine a century ago at t. 3502.

Cymbidium \times 'Bodmin Moor' var. 'Golden Glory.' F.C.C. March 9, 1937. A distinct hybrid with large light canary-yellow flowers, the labellum profusely spotted with red. It is the result of crossing *C. \times Alexanderi* with *C. \times 'Erica Sander'*, and was shown by Messrs. Sanders, St. Albans.

Cymbidium \times 'Hawfinch' var. 'Buttercup.' F.C.C. March 9, 1937. This elegant hybrid between *C. \times Alexanderi* and *C. \times 'Bustard'* bore two spikes with 7 and 5 flowers respectively, light primrose-yellow, the labellum lighter and marked with red. Exhibited by Sir William Cooke, Bart., Wyld Court, Hampstead Norris.

Cymbidium \times 'Janette,' Harben's var. A.M. March 23, 1937. The result of crossing *C. \times Alexanderi* with *C. \times 'Joy Sander.'* The spike bore 5 large cream flowers with salmon-pink shading, the labellum marked with bright red. Shown by Guy P. Harben, Esq., Lower Brook, King's Somborne, Hants.

Cymbidium \times 'Janette' var. 'Peach Blossom.' A.M. March 23, 1937. Although the flowers were closely set on the spike, they attracted attention on account of the pleasing peach colour. Exhibited by Guy P. Harben, Esq.

Cymbidium \times 'Jason' var. *exquisitum*. A.M. March 23, 1937. This was produced by crossing *C. \times Alexanderi* with *C. \times 'Miranda.'* The spike bore 12 flowers, cream-coloured with light green shading, the labellum spotted with red. Exhibited by the Hon. H. S. Tufton, Castle Hill, Englefield Green, Surrey.

Cymbidium \times 'Jason' var. *magnificum*. F.C.C. March 23, 1937. The result of crossing *C. \times Alexanderi* with *C. \times 'Miranda.'* The spike bore 9 large flowers, light buff-yellow, the apical area of the labellum stained with rose-pink and spotted with red. Shown by the Hon. H. S. Tufton.

Cymbidium \times 'Lillian Sander' var. 'Leo.' A.M. March 23, 1937. The spike bore 17 flowers of light buff colour, the labellum profusely spotted with red. The result of crossing *C. \times 'Erica Sander'* with *C. insignis*. Shown by Messrs. Sanders, St. Albans.

Cymbidium × '**Louis Sander**,' **Cooke's var.** **F.C.C.** March 9, 1937. The result of crossing *C. × Alexanderi* with *C. × 'Ceres.'* It received an **A.M.** on March 7, 1936, when it bore a spike of 4 flowers. On the present occasion it had a spike of 13 large flowers, of a pleasing light-rose colour, the labellum spotted with deep rose-pink. Exhibited by Sir William Cooke, Bart., Wyld Court, Hampstead Norris.

Cymbidium × '**Lyoth**' **var. 'Rosy Morn.'** **F.C.C.** March 23, 1937. This pleasing hybrid between *C. insigne* and *C. × 'Ceres'* bore a spike of 15 deep-rose flowers with reddish rose venation, the labellum spotted with red. Shown by the Hon. H. S. Tufton.

Cymbidium × '**Mopsa**' **Orchidhurst var.** **F.C.C.** March 23, 1937. The result of crossing *C. × 'Lettie'* with *C. × 'Memoria P. W. Janssen.'* The spike bore 12 flowers, blush-white, the labellum and column rosy-pink. Shown by Messrs. Armstrong & Brown, Tunbridge Wells.

Cymbidium × '**Pharos**' **var. 'Golden Beauty.'** **A.M.** March 9, 1937. A showy hybrid which bore a spike of eleven large flowers, amber-yellow with light green shading, the labellum spotted with red. It is the result of crossing *C. × 'Flamingo'* with *C. × 'Warbler,'* and was shown by Messrs. H. G. Alexander, Tetbury.

Cymbidium × '**Woodcock**' **var. 'Bronze King.'** **A.M.** March 23, 1937. Obtained by crossing *C. × Alexanderi* with *C. × 'Firefinch.'* The spike bore 10 large flowers, of reddish-fawn colour, the labellum marked with crimson on the apical lobe. Exhibited by Sir William Cooke, Bt., Wyld Court, Hampstead Norris, Berks.

***Freesia 'Enchantress.'** **A.M.** February 18, 1937. Sent by Messrs. G. C. van Meeuwen, Heemstede, Holland, raised by Messrs. H. Carlée. Plant vigorous, 18 inches tall; flower spikes stiff, branched; inflorescence 6- to 9-flowered; flowers 1½ inch diameter, fully expanded, bright rosy-carmine, throat white, with a bright yellow patch, 5 out at a time; substance and texture good.

***Freesia 'George Washington.'** **F.C.C.** February 18, 1937. Sent by Messrs. G. C. van Meeuwen, Heemstede, raised by Messrs. H. Carlée. Plant vigorous, 2 feet tall; flower spikes stiff, branched; inflorescence 6- to 10-flowered; flowers 1½ inch diameter, fully expanded, 4 or 5 out at a time, light golden-yellow suffused and edged with carmine-rose, throat lined carmine-rose on a light golden-yellow ground; substance and texture good.

***Freesia 'Gertrude Carlée.'** **H.C.** February 18, 1937. Sent by Messrs. G. C. van Meeuwen, Heemstede, raised by Messrs. H. Carlée. Plant 23 inches tall, vigorous; flower spikes stiff, branched; inflorescence 4- to 9-flowered; flowers 1½ inch diameter, bright clear golden-yellow, rich orange blotch at throat, 3 out at a time; substance good; does not open as fully as many varieties.

***Freesia 'Yellow Surprise.'** **A.M.** February 18, 1937. Sent by Messrs. G. C. van Meeuwen, Heemstede, raised by Messrs. Carlée

Plant vigorous, 20 inches tall ; flower spikes branched ; inflorescence 5- to 8-flowered ; flowers $1\frac{1}{2}$ inch diameter, well expanded, 5 out at a time, soft clear creamy-yellow, with orange-yellow blotch at the throat ; substance and texture good.

Kalmiopsis Leachiana. A.M. March 23, 1937. From Mrs. G. Anley, Woking. An uncommon Ericaceous shrub of small size, found in Oregon in 1930, related botanically both to *Kalmia* and *Rhododendron*. The bright rosy flowers form a congested raceme at the ends of the branches, and are cup-shaped, each about $\frac{1}{2}$ inch across with 10 stamens free from the corolla.

Laelia \times 'Firefly' var. 'Aureole.' A.M. March 9, 1937. The result of crossing *L.* \times 'Coronet' with *L. harpophylla*. Although the flowers have narrow segments, they are rendered particularly attractive by their rich orange-red colour. Staged by Messrs. Armstrong & Brown, Tunbridge Wells.

Laeliocattleya \times 'Nephtys' var. *superba*. A.M. March 23, 1937. Obtained by crossing *Cattleya* \times 'Fabia' with *L.-c.* \times 'Spalatro,' and regarded as a fine addition to the spring-flowering section of *Laeliocattleyas*. It is rose-purple in the sepals and petals, and rich crimson-purple in the wide labellum. Staged by Messrs. H. G. Alexander, Tetbury, Glos.

Odontioda \times 'Marie Antoinette' var. 'Jewel.' A.M. March 9, 1937. This hybrid bore a spike of 11 flowers with well-developed sepals and petals, which are deep rose with bold reddish markings, while the labellum has a conspicuous yellow crest. It results from the crossing of *Odontioda* \times 'Colinge' with *Odontoglossum* \times 'President Poincaré,' and was shown by Messrs. Charlesworth, Haywards Heath.

Primula Allionii 'Viscountess Byng.' A.M. March 9, 1937. A very fine seedling form of a very variable species. The stemless, long-tubed flowers may be $1\frac{1}{4}$ inch across. The petals are a clear shade of rose-pink, broad, rounded and overlapping, each with a notched apex.

Rhododendron \times 'Bo-peep.' A.M. March 23, 1937. From Lionel de Rothschild, Esq. A hybrid between *R. lutescens* and *R. moupinense*, with small trusses of delicate, cream-coloured flowers borne at the tips of the shoots ; corolla widely funnel-shaped, deeply lobed, the lobes slightly recurved, with pale yellow spots within at the back of the tube, about $1\frac{1}{2}$ inch wide by 1 inch deep. The small, rather pale leaves are glabrous on both sides.

Rhododendron bullatum. F.C.C. March 9, 1937. From Lionel de Rothschild, Esq. A plant for the cool greenhouse, with large, fragrant, white, widely funnel-shaped flowers up to 4 inches in diameter, with a dash of yellow in the centre and pink calyces, in loose trusses of four or five. The under-surfaces of the large bullate leaves, which are dull green above, and the young wood and petioles, are covered with thick cinnamon tomentum. There is a good picture of this plant in the R.H.S. JOURNAL, vol. 41, p. 197.

Rhododendron × 'Little Ben' (*R. neriflorum* × *R. repens*). F.C.C. March 23, 1937. From C. Scrase-Dickins, Esq., Coolhurst, Horsham. The particular seedling to which this award was made has beautiful deep scarlet flowers in loose trusses of 4 or 5. The 5-lobed, widely funnel-shaped corolla is up to $2\frac{1}{2}$ inches wide by $1\frac{1}{2}$ inch deep, and the unequal, somewhat lacerate lobes of the remarkable calyx are spreading, and sometimes nearly half the length of the corolla lobes, the latter being a shade darker than the calyx. The short pedicels are sparsely pubescent, and the glabrous leaves are up to 3 inches long by $1\frac{1}{2}$ inch wide. The plant is about a foot in height.

Rhododendron Macabeum. A.M. March 23, 1937. From Lieut.-Col. E. H. W. Bolitho, Trengwainton, Heamoor, Cornwall. A shrub bearing compact, somewhat flattened trusses, 6 to 7 inches across by about 4 inches deep, of 15 or 16 large, deeply campanulate, yellowish-white flowers with bright red exerted stigmas. The corolla is up to 2 inches across by $2\frac{1}{2}$ inches deep, with 8 small overlapping lobes. The oblanceolate, obtuse leaves are up to 13 inches long by $6\frac{1}{2}$ inches wide, dark glossy green above, white woolly tomentum beneath.

Rhododendron scopulorum. A.M. March 9, 1937. From Lionel de Rothschild, Esq. A flowering shrub for the cool greenhouse, with loose trusses about 6 inches diameter of four to seven pale pink, widely funnel-shaped flowers, the spreading corollas up to 3 inches wide by 2 inches deep. The petioles and young wood are glabrous, as are the rather small leaves, which are dark green above and paler beneath. Figured in the Botanical Magazine at t. 9399.

Soldanella alpina. A.M. March 23, 1937. From G. P. Baker, Esq., Sevenoaks. Occurring in the Alps, Pyrenees, and Appenines, this delightful species with several deep-lavender flowers on each stem has been in cultivation at least since the seventeenth century. The stems are 4 to 6 inches high and the rather open bells deeply fringed, with a protruding style.

Soldanella pusilla. A.M. March 23, 1937. From G. P. Baker, Esq., Sevenoaks. Found on the granite mountains of Switzerland and the Carpathians. A much smaller species in all its parts than *S. alpina*, the flowers more tubular, less deeply fringed and coloured, borne singly on each stem to a height of only 1 or 2 inches. The style is included within the corolla.

BOOK REVIEWS.

"Greenhouse Culture for Amateurs." By E. G. Wheelwright. 8vo. 163 pp. (Country Life, London, 1937.) 5s.

The contents of this book are not to be gathered by a strict interpretation of its title. The book actually attempts to deal with the cultivation of plants in or for the greenhouse—that is, the cool greenhouse or the cold house without artificial heat. Those for whom it is intended will find a great deal of useful information in it, especially as to the plants suitable for cultivation, provided they remember that a good number of the plants suggested may grow to a large size.

There is a tendency, and a quite natural one, among amateurs to regard all the different species of a genus as equally adaptable to one given set of circumstances, and books intended for them are rarely definite enough regarding the great diversity found in form and particularly in requirements within a given genus. The present one is no exception, for on p. 25 *Magnolias*, for instance, are mentioned as suitable for the cold house of large size—so some species are, but not all, and the only species mentioned further, and that for the small house, is the relatively uncommon *Magnolia fuscata*. Not all genera recommended are so superficially treated and there is much of value in the book—good general advice which if followed would lead to better results than one often sees and set the beginner on the right road for success with the less easy plants.

"Gardens and Gardening: Lay-outs for Small Owners." Ed. by F. A. Mercer. 4to. 134 pp. (Studio, London, 1937.) 10s. 6d.

This is the Studio Garden Annual which this year contains articles on designing new gardens and plans for small gardens together with a large number of illustrations (some in colour) of gardens and garden plants. Gardens in many countries have been drawn upon for the illustrations.

"Gardening for Finance or Fancy." By Fred Marshall. 8vo. 182 pp. (Author, Burley-in-Wharfedale, Yorks, 1936.) 3s.

The author is a working gardener and he has written in homely language out of his own experience an account of the cultivation of certain plants to which he has given particular attention. As such the book is a useful addition to the long list of gardening books and it is unnecessary to discuss it in detail. The plants with which he deals are China Asters, Early Cauliflowers, Chrysanthemums, Bulbs in pots, Lettuces, Roses, Sweet Peas and Tomatos. He has something to say also regarding marketing, garden frames, greenhouses and heating apparatus, and the soil.

"A Second Book of South African Flowers." By H. S. M. Bolus, D. Barclay, and E. J. Steer. 4to. (Capetown, 1936). 21s.

Mrs. Bolus has produced a charming sequel to "A First Book of South African Flowers," published over eight years ago. It does not purport to make a scientific contribution to our knowledge of the wonderful flora of South Africa, and, as the authoress writes in her preface, its main object is to interest the young, and to make them active participants in the preservation of the beautiful flowers of the countryside.

She enjoys a high reputation as a botanist and has contrived in her description of plants to avoid the use of unnecessary botanical terms to a remarkable extent, although, perhaps, *hysteranthous* and *androecium* are rather hard words for the young to swallow. Generally speaking, however, her letterpress is admirably adapted to her purpose, and is full of information, historical, topical and botanical, for flower lovers of all ages. We particularly welcome the insertion of local flower names. The illustrations are admirable, and we cannot refrain from commending in particular Miss Page's beautiful drawings of *Stapelias* and other succulents, Miss Barclay's delightful *Gladioli*, and Doctor Leslie's brilliant photographs of *Ceropegia*.

Special reference should be made to those portions of the book which deal with the Proteaceae—so splendidly represented in South Africa—and with Gladioli, and hope that the space which the authoress has devoted to that lovely genus may prove a forecast of her intention to produce the monograph which is so much needed. The proofs have been very carefully read and we have only been able to detect two unimportant oversights, and the index is adequate.

We can recommend the book unreservedly to every lover of flowers alike for its letterpress and its illustrations.

C. H. G.

"Hardy Fruit Growing." By Sir F. W. Keeble and A. N. Rawes. 8vo. (Macmillan, London, 1936). 16s.

Amateur gardeners are not an easy race to lead down the garden path, but I am confident that few need be without fruit in succession in a normal year in the majority of soils in the southern half of England if they will combine perseverance with an intelligent digestion of the principles and practice so amply laid down by Sir Frederick Keeble and Mr. A. N. Rawes in their book on Hardy Fruit Growing.

Many amateur growers set out to establish a satisfactory fruit garden on ground which they have chosen for reasons quite unconnected with the growing of fruit. A house and grounds are acquired because the site is a healthy one or because of its social or business amenities. Small holes are dug in a plot of grass at one end of it. Old trees on dwarfing stocks are bought from the nearest nurseryman, and ten years after one is told that Messrs. Jones & Co. are no good for fruit trees. It is agreed that the trees bore a little fruit in the first year, but they have hardly existed since.

The authors of this book insist on the preparation of land by deep trenching, and their directions for cultivation and washing in subsequent years are full and clear.

I notice that when dealing with wind screens they do not mention the fast-growing Canadian Poplar. If close planted and adequately root- and top-pruned it has much to commend it in spite of its greed and ugliness. Also they do not mention that Black Currants are generally planted much too close, though they give planting distances for other fruit. When planting fruit trees I personally should give a preference to a site which had a slope S.S.E., but if I differ from the authors to this extent I notice with pleasure that they have not overlooked the interesting question of air pockets.

The authors rightly dwell on the importance of pollination. In the case of plums, want of crop is often ascribed to absence of pollination, when a timely bud wash against the ubiquitous tit would have provided the safeguard. A suitable mixture for laying down an orchard to grass is given. Personally I find that lucerne gives good results. It means more frequent mowing, but the roots bring up food for the trees from great depth. It must of course never be carted off the orchard, but allowed to rot.

I hope no amateur grower will be frightened by the very full list of pests and the necessary controls. Given sound trees and good cultivation free from hungry and overhanging forest trees, three correct washings a year will generally result in satisfactory fruit. If the grower wants to know how it is done, let him read this book, and having read it read it again, as I have done with much pleasure and profit.

H. BARNETT

NOTES AND ABSTRACTS.

Aloe bulbocaulis Christian (*Fl. Plants S. Afr.*, t. 630; July 1936).—A new species from N. Rhodesia with a rosette of large stout leaves and a branched inflorescence about 32 inches high with olive-buff perianth (green for the most part in the figure).—*F. J. C.*

Aloe nubligena Groenewald. By E. P. Phillips (*Fl. Plants S. Afr.*, t. 628; July 1936).—A sub-caulescent species growing in clumps with slender leaves about 18 inches long, and an inflorescence about 9 inches high with several eventually pendulous scarlet flowers green at the tips.—*F. J. C.*

Carnations, anther sweat of. By H. E. White (*Gard. Chron.*, 3 Oct. 1936, p. 254; with 2 figures).—This disease lately became prevalent in a nursery, and the description of the appearance of affected plants and the warning as to its dangers should help to prevent it spreading.—*E. A. B.*

Dianthus Kirkii Burt Davy. By E. P. Phillips. (*Fl. Plants S. Afr.*, t. 626; July 1936).—Found near Pretoria, a slender species with rather ragged, mauve flowers. The shoots arise at the apex of a thick rhizome.—*F. J. C.*

Dimorphotheca jucunda Phillips (*Fl. Plants S. Afr.*, t. 629; July 1936).—A new species from the Transvaal with deep pink, almost red-purple, flowers. The stems are branched and the involucral bracts are no longer than the disc florets.—*F. J. C.*

Experimental Production of Haploids and Polyploids. (*Imp. Bur. Pl. Genetics, Cambridge* 1936).—A summary of papers on the artificial production of aberrant types of cell division in both the plant body and the cells concerned in seed-production (pollen and ovule contents), which are believed to precede certain variations in form and to give rise to new varieties in plants. The action of X-rays, high and low temperatures, and various chemicals, as well as of certain natural agents is briefly discussed with reference to the papers where the evidence is recounted.—*F. J. C.*

Fritillaria glaucoviridis. By W. B. Turrill (*Bot. Mag.*, t. 9462; Nov. 1936).—A small species from S. Asia Minor, bearing one or two nodding green flowers about $1\frac{1}{2}$ inch long by $\frac{1}{4}$ inch wide, and leaves up to $3\frac{1}{2}$ inches long by 2 inches broad (basal), and 4 inches long by $1\frac{1}{2}$ inch wide (cauline). Distinguishable from its near allies by its stout style.—*M. S.*

Herpetospermum pedunculosum (Seringe) C. B. Clarke. By B. L. Burt (*Bot. Mag.*, t. 9463; Nov. 1936).—An herbaceous climbing ornamental Cucurbit, native in N. India from Simla through Nepal and Sikkim to Assam, with large bright lemon-yellow flowers about $3\frac{1}{2}$ inches wide, and denticulate cordate leaves up to 6 inches long by 5 inches wide.—*M. S.*

Lewisia brachycalyx Engelmann. By J. R. Sealy (*Bot. Mag.*, t. 9465; Nov. 1936).—An easily grown, low, compact, free-flowering perennial from W. New Mexico, Arizona, S. Utah and S. California, distinguished from its nearest ally, *L. Kelloggii*, by its entire bracts and sepals. A plant for the alpine house or rock garden.—*M. S.*

Polystachya Sandersonii Harv. By E. P. Phillips (*Fl. Plants S. Afr.*, t. 627; July 1936).—A Transvaal epiphytic orchid with small dull reddish-yellow flowers.—*F. J. C.*

Primula suffrutescens. By Prof. W. C. Blasdale (*New Flora and Silva*, ix, pp. 120–123; 1937).—Note on the 'Sierra Primrose,' accompanied by two photographs from the natural habitat. *Primula suffrutescens* is confined to a limited area of the State of California, where it occurs only on the highest peaks, forming patches several feet across in pockets of porous granitic gravel mixed with considerable humus. The rose-pink to reddish flowers are carried in umbels of four to ten on short scapes and have a yellow ring in the throat. The wedge-shaped leaves are inclined to succulence and have a few teeth at their apex.—*B. O. M.*

Rhododendron erinigerum Franch. By J. Hutchinson (*Bot. Mag.*, t. 9464; Nov. 1936).—A hardy shrub from S.E. Tibet and N.W. Yunnan, up to 13 feet high, with trusses of twelve to fifteen carmine-spotted pink flowers; inner bud scales apparently but partially modified leaves; the young shoots, petioles, calyx, pedicels, etc., glandular-hairy.—*M. S.*

Rhododendrons of Ceylon, South India and Manipur. By J. M. Cowan (*Notes R.B.G. Edinb.*, vol. xix, pp. 157-166; illus.; 1936).—From the Himalayan *Rhododendron arboreum*, with which they have been associated, the author distinguishes as species *R. nilagiricum* (*Bot. Mag.*, t. 9323, but not t. 4381 which is *R. arboreum*) of South India, *R. zeylanicum* (syn. *R. arboreum* var. *Kingianum*; *Bot. Mag.*, t. 7696) of Ceylon, and *R. Wattii* (new species) of Manipur; their confused nomenclature is unravelled and *R. zeylanicum* and *R. Wattii* described in detail.—*W. T. S.*

Rhododendrons, Some New Asiatic, discovered by Kingdon Ward. By J. M. Cowan (*Notes R.B.G. Edinb.*, vol. xix, pp. 179-186; 1936).—New species described are *R. circinnatum* (F. K. W. 11964), Taliense series; *R. pankimense* (F. K. W. 11378), Irroratum ser.; *R. parmulatum* (F. K. W. 5875), Sanguineum ser.; *R. Ramsdenianum* (F. K. W. 6284), Irroratum ser.; *R. silvaticum* (F. K. W. 6258), Arboreum ser.; and *R. trichocladum* var. *longipilosum* (F. K. W. 11915). Several have flowered in cultivation.—*W. T. S.*

Sempervivum Studies, 1 [*Sempervivum tanulmányok, 1*]. By J. Domokos (*Kert. Tanin. Közl., Bull. Roy. Hungarian Hort. College, I.* pp. 26-29; 1935).—The description of *Sempervivum tectorum* in Javorka's Magyar Flora applies to the subsp. *tectorum* (L.) Wettst. which is in Hungary only a naturalized or cultivated plant. Nevertheless *tectorum* forms with properly formed anthers and carpels occur in places where they are undoubtedly indigenous, e.g. in the Bihar district as well as in Transylvania. Praeger's statement that in the field there is little chance of confusion between *S. Schlehanii* and *S. tectorum*, because their ranges only slightly overlap, is not true of south-west Hungary, where they are abundant together over large districts and readily hybridize. The hybrid *S. tectorum* × *S. Schlehanii* is here named *S. Michaelis-Borsii* Domokos, diagnosed as having "leaves of the rosettes puberulous, at length almost glabrous" and found in the Torda ravine and on Mount S.ékely, fairly abundant among the parents. The paper is in Magyar and German.—*W. T. S.*

Stock, leaf-spot of. By W. M. Ware (*Gard. Chron.*, 26 Sept. 1937, p. 236; with 3 figures).—This form of leaf-spot disease is new to this country. It is believed to resemble, and may be identical with, one recorded by Yoshii on *Brassica chinensis* as *Alternaria Brassicae* var. *macrospora*.—*E. A. B.*

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SOME FLOWERING SHRUBS IN A SMALL EAST DORSET GARDEN.

By MRS. A. DESBOROUGH.

WHEN we came to this garden in 1921 it had been allowed to grow wild for some seven or eight years. Previously it had formed part of the garden of the late Professor ALFRED RUSSELL WALLACE, so that we had most interesting hunts for survivors of his planting amongst the jungle of brambles, gorse, rushes and grass.

Several unusual small trees and shrubs were noticeable, though there were many "tombstones"—old labels—in what had evidently been a kind of rock garden, grown waist high with brambles and weeds. Some interesting shrubs were found in what had become a dense thicket of self-sown birch trees, and a very old remnant of *Citrus trifoliata* in dense shade under a large bush of *Berberis Darwinii*.

The garden lies on a slope towards the south, with a thick semicircle of old *Rhododendron ponticum*, oaks, and birches sheltering it on the south-east, and some old oak, chestnut and birch trees protecting it from the worst of the south and south-west gales; between these trees are views out over an open gorse common to Poole Harbour and the Purbeck Hills (fig. 67).

The lie of the land gives many sheltered bays and corners, though the upper slopes are fully exposed to all the winds, and cold airs and frosts are apt to flow down to the flatter part below. The soil is mostly a very heavy clay, sometimes a yellow clay, sometimes a greyish-white almost fit for pottery, and very hard to work. Here and there are a few patches of sand. Before planting it was essential to break up the heavy soil very deeply, digging in large quantities of

leaves and inoculating the surface with light dressings of live soil to ensure bacterial activity.

One has to live in a garden for some time before becoming fully aware of its possibilities and limitations as to soil, aspect and lay-out. In this garden certain very prevalent weeds showed the general acidity of the soil, and heavy dressings of lime were necessary before any vegetables could be grown. In the rest of the garden where so many Ericaceous and other plants disliking lime were growing, or were to be planted, the only way to get the soil into suitable condition was by continual cultivation and adding leaf mould to increase the permeability of the soil. Also, where the site was on a very heavy sticky clay, the danger of planting in a hole, even in a generously large one and on a sharp slope, without a drainage trench out from the bottom of the hole, soon became apparent; the result was simply a sump, which sooner or later became more or less filled with stagnant water.

Amongst the interesting things planted by Professor WALLACE that were still surviving, we found a 20-ft. *Styrax japonica*, two fine old bushes of *Tricuspidaria lanceolata* (*Crinodendron Hookeri*), *Drimys Winteri*, a Tulip tree, a Liquidambar, *Acer Negundo*, some *Leptospermums* and, most striking of all, a 20-ft. high double-stemmed *Embothrium coccineum*, which each June well deserved its name of "flame tree." This, unfortunately, had been badly overgrown by some tall birches and forced to lean out towards the east, so that several times ice or snow lodged on the trunks or in the fork and, eventually caused its death by bark splitting after the spring of 1928 when, during our absence, the ice remained on it for over two weeks. Happily, by then, there were three or four young plants put out, propagated by cuttings (very slow at first) or from suckers (which grow quickly) so that there has not been a June without some *Embothrium* blossom, though nothing yet like the display of the old tree. The original tree, while neglected, did not appear to have suckered at all, but after we began to cultivate round it and, possibly, injured some of the roots, it provided a good number of plants. The old tree and these suckers growing near it, have caused several visitors to say, "I see you grow both forms," noticing the short blunt leaves on the old one and the 4 to 5 inches long by 1 to 1½ inch wide leaves on the young plants, and have needed to be convinced that both were growing from the same roots, young plants not attaining the blunt short leaves before maturity. Since then we have been given one of the consistently long narrow-leaved deciduous form introduced by Mr. COMBER, and can appreciate that there is also a difference in the way the panicles grow.

Fig. 68 shows one of the *Tricuspidarias* with a *Drimys* behind it, both sheltered and slightly over-topped by an oak. More recent planting in this group includes *Teloëa truncata*, about 6 feet high on the right, a *Rhaphitamnus cyanocarpus* behind that and a *Celmisia coriacea Monroi* below. The *Celmisia* was also a relic—found com-

pletely hidden under gorse and rushes—a very old, almost woody plant, fortunately well provided with offshoots. I have been told that it does not do well in the Edinburgh Botanic Gardens, as “it is hard to keep dry enough” there, but here any dryness or full sun seems fatal to it and it does best in a dampish place in chequered sunlight.

Turning more to the east, the group shown in Fig. 69, backed by a large chestnut tree in the next garden, shows *Styrax Obassia* and *Sophora tetraptera grandiflora* (*Edwardsia*) behind, *Olearia stellulata*, very showy, on the left; near that, quite inconspicuous, a ten-year-old *Michelia figo* (*Magnolia fuscata*), most sweetly scented, and *Anopterus glandulosus*, a slow-growing but lovely thing, with its panicles of large lily-of-the-valley-like flowers half hidden in the leaves; also a bush of *Raphiolepis*, received here as *Raphiolepis indica*, but more like *R. umbellata*, only later in flowering.

Farther to the left is a thicket of *Mimosa* (*Acacia dealbata*) which came here as a bunch of seedlings collected in the Var District in 1921. Once, since then, they have been killed to the ground (1928), but quickly grew up again into 25 to 30-feet high trees which flower profusely after a warm summer, only fairly after a cold one, and not at all if the freshly-set buds get caught by a frost in the autumn when they are wet. A dry frost, later in the winter, does not seem to hurt them so much. Once established it is almost impossible to eradicate, suckers and seedlings appearing many yards away.

Two more survivors are shown in Fig. 70, a graceful specimen about 20 feet high of *Azara microphylla* on the right, and part of a large clump of Bamboo on the left, behind the raised pond. This Bamboo has been somewhat of a menace, pushing its long spiky shoots underground through the lower side of a pond that had been made with puddled clay, so that the present more solid pond had to be built, and the water lilies and goldfish transferred to it in the middle of a winter, much to their detriment.

Where the old pond was is now filled up and a site for many of the commoner damp-loving Primulas—*Primula pulverulenta*, *P. japonica*, *P. denticulata*, etc.—a family of which one can hardly have too many. A *Primula* introduced not many years ago, akin to *P. denticulata*, is *P. himalaica*, a most satisfactory plant, earlier, and clearer in colour than *denticulata*. *P. elatior*, collected in the Pyrenees, is also worth having for its early flowers in December or January.

This bit of rock garden is not worthy of the name, but holds many things collected on holidays. *Paeonia Cambessedesii* flourished here for a number of years, until it had to be moved to make way for the pond building, and there are still seedlings of the original seedlings brought from Majorca in 1923. *Cyclamen balearicum* has also survived from then—a somewhat shy flowerer, but very charming and, to some people, very sweet scented. There is a large boss of *Globularia* taken from a roadside cliff in the Pyrenees, a cherished mat of the Lower Pyrenees form of *Gentiana verna*, *Narcissus Bulbocodium* and

N. juncifolius, *Hyacinthus amethystinus*, *Fritillaria pyrenaica*, the little *Linaria alpina concolor*, which sows itself everywhere, *Anemone ranunculoides* and *A. fulgens*, and a form of *A. nemorosa* with broad-petalled, large and very blue-violet flowers. A plant of a very early flowering *Helleborus niger*, a deep coloured and compact form of *Polygala Chamaebuxus*, Snowflakes, Crocus and St. Bruno's Lily remind us of another holiday; *Anemone stellata* and *Romulea* of another, and so on. Another interesting plant collected in the Lower Pyrenees is *Lathraea Clandestina*, a parasite, which we found colouring a riverside meadow like deep purple Crocuses. There it was parasitic on the roots of poplars; here it seems equally at home on birch roots. One first catches sight of its violet-purple clumps about mid-January, and it continues to appear unexpectedly here and there below trees up to July.

Soil, position and treatment in one garden cannot be prescribed for any other garden, even in the same district, and one learns most from one's many failures and some unexpected successes, and by noticing where and how things do best in other gardens.

With certain of the Chilean trees and shrubs, for instance, our experience has been that it is not cold that is the chief danger, but root scorch. Once a *Crinodendron* or a *Desfontainea* has reached some size and spread of branches, they make their own root shelter, but for several years, unless well shaded by neighbouring plants, the roots, which are very near the surface, need heavy and continual mulching, both summer and winter. Any cracking or drying out of the soil seems fatal, though they appear to like sun on their heads for at least part of the day. The species of *Camellia* also seem to do better with generous mulchings (a dressing of old soot improves the colour of the foliage) and, here, as long as the soil is not allowed to dry out, *Camellia Sasanqua*, *C. cuspidata* and *C. oleifera* do better in sun or half sun rather than in woodland. *C. reticulata* is more tender, so further shelter from all cold winds is necessary. One of the less showy, but otherwise interesting *Camellias* is *C. Thea assamica*, the Tea plant, and, as all the species mentioned above flower between October and May, they are most valuable in an "all the year round" garden. Several of the *Stewartias* have been established here for many years and do well. These also are surface-rooting shrubs that need good mulches of leaf soil, or to be grown in thin woodland where they can get some sun but not be dried up. *Stewartia Pseudo-Camellia* about 15 feet high, does well in favourable seasons, but the flowers are fugitive and the foliage liable to be badly cut by late frosts. *S. pentagyna grandiflora* and *S. Malacodendron* are, we think, the most beautiful that we have yet flowered, *S. Pseudo-Camellia* and *S. sinensis* the best for autumn colour.

The *Magnolias* are great favourites, and we are trying to grow some sixteen species, most of which will require many years yet before they reach maturity. Some are proving very susceptible to late spring frosts, *Magnolia rostrata* being particularly spring-tender.



67 TUCIFY WOOD VIEW FROM THE VERANDA OVER POOL TO
THE PURBECK HILLS



FIG. 65 SHRUBS AT TUGLEY WOOD
DRIMYS WINTERI AT BACK. IRICUSPIDARIA LANCIOLOATA ON TREE
AND TEFLOIA TRUNCAIA ON RIGHT

Of those flowering before the leaves unfold, *M. salicifolia*, flowering in April, fragrant in flower, leaf and bark, and already about 16 feet high, is most attractive. *M. Kobus*, here, is uncertain as to flower, but in a good season is also very charming. Of the June-flowering ones it is hard to say whether *M. Watsonii*, *M. Wilsonii* or *M. parviflora* is the most beautiful in actual blossom, but *M. Wilsonii* has a very graceful habit. *M. grandiflora ferruginea* in the open makes a very striking bush, with its russet underfelt and large flowers, and *Michelia figo*, one of the smallest and least showy in blossom, excels all in sweetness of scent. A Chinese friend from Shanghai told us how the flowers or even single petals are sent up from Southern China and sold by hawkers, a single flower put on cotton wool floating in a bowl of water scenting the whole room.

In a small garden the number of the larger growing and larger leaved Rhododendrons has to be sternly restricted, and hybrid forms, except *Rhododendron Loderi*, *R. Standishii* and a few others, practically excluded, but the former are so wonderful in foliage all the year one must make room for some, as well as for a somewhat larger choice of the less tall growing ones, and, of the dwarfs, all one can grow.

The upper more exposed slopes here seem to suit all the Tree Heaths well. *Erica arborea*, *E. arborea alpina*, and *E. lusitanica* (*codonodes*) have increased in size and numbers rapidly, sowing freely; *E. australis* flowers and grows well, but has not naturalized like the others, and the white *E. australis* 'Mr. Robert' is hard to keep going really well. Of the smaller Heaths a form of *Daboecia polifolia* collected in the Pyrenees, of a deeper rose colour and larger bell than the type, is attractive. The scent of the Tree Heaths in flower in April and May is wonderful. Beginning with *E. lusitanica* in January, succeeded by *E. Veitchii*, *E. arborea*, *E. australis* and *E. australis* 'Mr. Robert,' *E. arborea alpina* ends the show of the taller kinds for us in June.

Another genus which does well on our exposed sandy slope is *Leptospermum*. *Leptospermums* seem to enjoy both sun and wind. *Leptospermum Nicholii* is magnificent in colour, *L. Chapmanii* nearly as fine and larger in flower. *L. scoparium* and its many varieties in colour from pure white, white with pink buds, and pink up to the ruby-red of *Nicholii* come first, *L. lanigerum*, with its silky grey-green foliage and masses of white flowers some weeks later, and much later still, among the definitely later summer-flowering shrubs, *L. Rodwayanum*, with its more rigid growth, larger dark green leaves and open white sweet-scented flowers about the size of a shilling. *L. baccatum*, either very slow growing or more naturally dwarf, is also worth growing.

We have been fortunate in having a site that suits some of the Cornus family, and they are particularly worth growing for their long flowering season as well as for their great beauty. *Cornus Mas* is already yellow in January, closely followed by *C. officinalis*, of the

same type, but perhaps more brilliant. *C. florida rubra* is most beautiful in April and May, especially if the bracts show their pink and white against the bare grey brown twigs before the leaves expand. *C. Kousa* and *C. Kousa chinensis* (Fig. 71), the purest white, and *C. capitata* (*Benthamia*), primrose yellow, finish the flowering season here, but most are very vivid later with autumn colour.

On return from a holiday in the Var District of Southern France, we decided to turn an empty sandy slope into a miniature "maquis," planting only *Cistus*, Myrtles, Tree Heaths, *Teucrium*, *Genista*, and such like, believing that the close companionship of each with the other would ensure their safety, and in this we have been justified through all the winters, mild or severe, of the past twelve years, hardly losing a *Cistus* even in the spring of 1928, and it has, until lately, been very charming to look at when the Heaths and the *Cistus*, etc., are in flower. Now age has rather spoilt the idea, as some of the Heaths have grown so tall as to overpower other things, *Mimosas* have sprung up to shade them, and many of the *Cistus*, to reach the light, have become very gaunt.

In reclaiming, laying out and developing the garden, which is only $3\frac{1}{2}$ acres all told, including orchard, vegetables and a plantation of oak and ash trees, the first consideration was "flowers all the year round." Increasing age and the minimum of labour beyond our own, indicated that to have any success at all, it would be wiser to omit all herbaceous and bedding-out plants that require routine attention and concentrate on such flowering shrubs and wild species as can be trusted, in a measure, to take care of themselves. The range of spring-flowering shrubs is so enormous, and the majority of them so well known to visitors attending Chelsea and the earlier R.H.S. Shows, that a description of them would be endless, but for those who want plants to look at and to pick in winter, later summer and autumn, the following notes may possibly be of interest.

For beauty out of doors or picking for the house during the dark days—say from October to the end of January—our chief shrubs are *Prunus subhirtella autumnalis*, flowering off and on all that period on the bare wood, and then again later with the new leaves, most completely veiled with flowers and at its best in November and December; *Hamamelis*, both *Hamamelis mollis* and *H. japonica arborea*, in December and January (*H. virginiana* should precede these by several weeks and, if it is a year of early leaf fall, its pale yellow "spiders" are lovely against the bare branches, otherwise it is hardly noticeable); then the *Camellias*, *Camellia Sasanqua*, *C. Thea assamica*, *C. oleifera*, and the hybrid *C. japonica* follow each other until the spring species begin.

With the new year come the *Mezereum* *Daphnes*, rose, purple and white; *Daphne hybrida* (*Dauphinii*), and some weeks later *D. odora* (*indica*); *Lithospermum rosmarinifolium*, with its truly gentian-blue flowers, and the *Grevilleas*, *Grevillea rosmarinifolia*, *G. thyrsoides*, and a form of *G. alpina*, crimson in bud and pink in flower. Of these

Grevilleas, *G. thyrsoides* is the brightest in colour and most compact in habit.

January and February also bring the flowers of the Cydonias, of which here, as all are in the open, the hybrid *Cydonia cardinalis* is the earliest, with *C. Maulei*'s more orange-scarlet blossoms in February rather than earlier, and 'Knap Hill Scarlet' in March and April. *C. Maulei* has a second season of beauty in autumn when the branches are laden with golden-yellow orange-shaped fruits, most decorative for the house.

Another very decorative shrub in January, and also a very sweet-scented one, is *Berberis Bealii*. Not so showy, but particularly sweet are the bush honeysuckles, *Lonicera Standishii* first and then *L. fragrantissima*, a scent imperceptible to some and very strong to others. *Azara integrifolia* is set with its yellow balls very early, but if the weather is severe in January, these wait for mild days before becoming fluffy—or they drop if caught by too hard a frost. This also is very sweet scented with quite a different smell from *A. microphylla*, which is generally about a month later. The two *Corylopsis* we have, *Corylopsis pauciflora* and *C. Veitchiana*, are late winter or early spring flowering according to the season, and the primrose-yellow drooping spikes are most decorative against their bare twigs, and scent the air around them.

Another interesting shrub that has flowered here in January and February for the past two years is *Atherosperma moschatum*, with small cup-shaped flowers, singly in the leaf axils and opposite, serrated, very aromatic leaves, a somewhat shiny dark green above and greyish green beneath. This is puzzling, as it is recorded as a June flowerer introduced from New Holland in 1824, known as the "Plume Nutmeg," or the "Tasmanian Sassafras," generally grown in greenhouses.

That ends a list of most of the winter-flowering things we grow here, which has certainly many omissions, both in shrubs and all the winter-flowering bulbs and small things, including some of the early Rhododendrons, but an invaluable one of those is *Iris unguicularis*, beginning, as a rule, in late October, both violet and white, and with its later and darker form going on until April.

But the late autumn and winter are the times above all to appreciate the berrying shrubs: the multitudinous Barberries, the Pernettias, and the hosts of Cotoneaster, Pyracantha, Malus and Sorbus, etc., that are so gay out of doors until the birds have cleared them, and so long lasting and decorative indoors.

Before passing on to the late summer-flowering shrubs, there are two among the spring shrubs that it may be interesting to mention: *Dipelta floribunda*, with its pink, yellow-throated, rather Weigela-like blossoms, and *Lomatia tinctoria*, with tufts of white flowers and finely divided foliage.

Among the July- and August-flowering shrubs that are so valuable after the rush of the spring and early summer is over, we think one must put the *Eucryphias* very high, both for beauty of flower and,

in the case of *Eucryphia glutinosa* (*pinnatifolia*), for autumn colour. *E. glutinosa* may begin to flower when about 2 feet high, *E. Billardieri* at about 4 feet, but one has to wait for *E. cordifolia* to be over 10 feet before one can hope for flower. All seem to need a lime-free soil, and here, at any rate, a position where they do not get dried up.

Though there are so many spring- and summer-flowering Magnolias, *Magnolia grandiflora ferruginea* often goes on until the first hard frost. Of the very large group of *Genista* and *Cytisus*, there are several that flower late: *Genista aethnensis* is a lovely sight when covered with its smallish pale-yellow flowers, that scent the air for many yards. Like the Tree Heaths, it is not "fast of its smell." *Cytisus nigricans* is a good clear yellow, and *Spartium junceum* makes a very handsome, if somewhat leggy group, flowering from late June often up to November.

Genista monspeliensis sows itself so freely here that one needs every year to pull up many that have grown bare up the stem. The *Clematis* do not do very well here in our acid soil, but a late-flowering one, *Clematis Jouiniana*, flourishes, and has pretty pale violet trusses. *C. cirrhosa* grows over and through a *Leptospermum* and is very attractive, though not showy. The *Clethras*, *Clethra alnifolia* and *C. canescens*, are not very conspicuous, but so sweet scented, even from some distance, that they are rarely overlooked. The *Yuccas*, especially *Yucca gloriosa* (when it does flower) and *Y. recurva* and *Y. filamentosa*, the latter very free flowering, make a good late summer effect. Of the *Olearias* that flower after June, *Olearia semidentata* is outstanding, and *O. avicenniaefolia* valuable because it is at its best in September and October.

I notice that all these late summer-flowering shrubs mentioned, so far are either white, yellow or lavender, so must remember the more vivid coloured ones.

The first that occurs to me, flowering in August, is *Campsis radicans*, a lovely brick red (*C. chinensis* is an even finer colour, but we have not got it). *Desfontainea spinosa* has 3-inches long pendent scarlet and yellow tubes. *Mitraria coccinea* is a vivid scarlet-crimson. The last shrub seems to need a dampish spot in shade, and some form of support to prevent its yard-long slender growths trailing (and rooting) on the ground, and its pendent flowers from getting muddy.

Philesia buxifolia is a plant for an acid woodland soil, as is also *Lapageria rosea* (we are trying the latter through a medium-sized *Rhododendron*, having no wall for it), and the waxy rose-crimson bells of both are equally beautiful.

Another brilliant red summer flowerer is the *Callistemon*, of which the names of the species and varieties are rather confusing. We have two, one in which the stamens give the effect of a scarlet bottle brush, the other a more rose or crimson colour, and call them respectively *Callistemon speciosus* and *C. linearis*, but both have rather reddish young growths, and we have seen much the same as either under



FIG. 69 SHRUBS AT TUGLEY WOOD
SOTHOXA HIRAIHUKA AND *STYKAX OBASSIA* AT BACK *OILAKIA SITTICULATA*
RAPHIOLEPIS AND *ANOPTERUS GLANDULOSA* IN FRONT



FIG 70. RAISED POOL IN ROCK GARDEN. LUCY WOOD.
AZARA MICROPHYLLA ON RIGHT

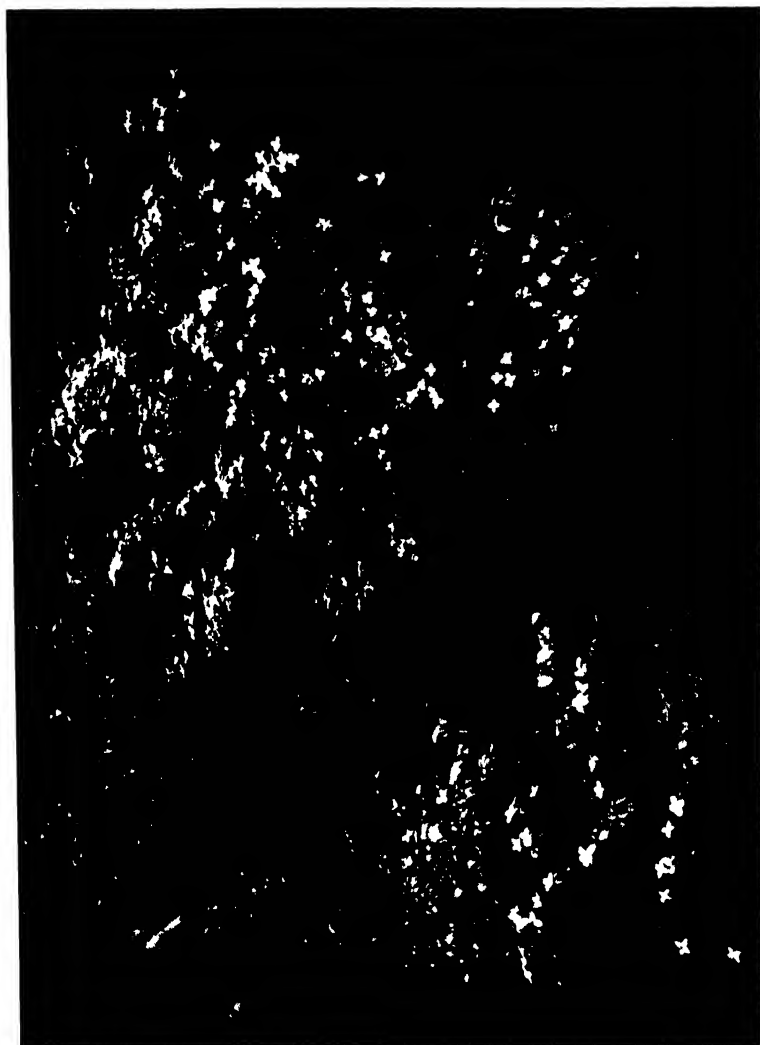


FIG. 71. CORNUS KOTSA, ETC. AT FUGITA WOOD.



FIG. 72 SANDY BANK AT TUGLEY WOOD

BROOKS ABOVE PINKS AND THYMIS BELOW WITH BUTTOL'S PLANTS GROWING THROUGH

To face p. 237

different names elsewhere. They seem much hardier than generally reported, and to like full sunshine with leaf mould or old pine needles for a mulch.

Fremontia mexicana is another very bright summer flower, continuing into late autumn, with a clear yellow saucer about $2\frac{1}{2}$ inches across, and even when the coloured calyces have faded they are ornamental, turning a reddish-brown round the angled-seed pods.

In many lists one sees this called *Fremontia californica*, but that is a less pyramidal-shaped bush, more spreading in habit, with less noticeable rufous hairs on the wood, and altogether more twiggy and arching and very hard to obtain, even from California.

Of the four *Abelias* we are growing here, *Abelia triflora* is a bush with small white, very sweet-scented flowers in June, inconspicuous were it not for its great fragrance. *A. floribunda* carries its showy long funnel-shaped, rose-magenta clusters well into late July or even August. *A. Schumannii* has long arching sprays with shorter pinky-lilac flowers from the end of June until autumn; and *A. grandiflora*, a charming neat bush, with again arching sprays, is covered with pale pinkish-white blossoms, about the size of a white jasmine, until the frosts. Even into the new year the persistent bronzy-red bracts make the bush decorative and the branches last well indoors.

Many of the *Buddleias* are most useful and handsome in the late summer, and one would be sorry to be without the well-known *Buddleia Davidi*, with its long purple spikes, so attractive to butterflies. *B. globosa*, equally well known, is very striking too, and there are several others one does not see so often, that are well worth having, even in a small garden. Of these, *B. Colvillei* is not always a free flowerer, but when it is, its trusses of large claret-coloured flowers are very effective; *B. Fallowiana alba* has long spikes of white flowers about the size of those of *B. Davidi*, and most strikingly white foliage; *B. alternifolia* carries its small violet flowers tightly wreathed along the arching sprays. Another, which reached us under the name of *B. Lindleyana*, has loose spikes of pale violet flowers, and seems likely to be tall growing. The last, and *B. auriculata*, whose rather inconspicuous white flowers are particularly sweet scented, are the latest to flower, and carry on right into early winter here.

For a brilliant mass of clear yellow, *Calceolaria integrifolia* is very useful in late summer, and looks its best with some shorter plants in front, as it is apt to become "leggy" unless severely cut back.

Another beautiful yellow-flowering shrub is *Dendromecon rigidum*, liable to be cut back by spring frosts or even killed in a severe winter, but worth trying again and again. Its poppy-like flowers are not as big as those of its relation, *Romneya Coulteri*, but its smell like cucumber, and its glaucous leaves are pleasant, and one can often find it in flower up to December. By the way, some people find *Romneya* hard to establish, but we have found a tip given by a friend unfailing: instead of carrying off many suckers from generous givers,

ask for one old woody stool, and treat it like Rhubarb, planting bits with "eyes."

The Hydrangeas are good late flowerers and most interesting in their colour variety. The garden cultural forms of Hydrangea are very well known, but the identification of the many varieties of forms of this species is most puzzling, as well as the determination of the allied species, and I will not venture on giving names here, only suggest that there is a lovely one which has very pure white large sterile florets surrounding very blue fertile flowers, another that starts with white outer florets that turn a good pink, another with a combination of violet and pink, and that some of these combinations are quite lovely. *H. quercifolia* has handsome oak-leaf foliage, which takes good autumn tints, and the large pyramid-shaped panicles of creamy white flowers are a little looser, but just as effective as those of *H. paniculata*.

One advantage of an "all the year round" garden growing species plants from many countries, is the great variety of colour and form of foliage to be enjoyed at all times. Such a garden, unless quite large, can rarely have continuous "masses of bright colour," that is, groups of any one species or variety or garden form, but one can have a continual succession of points of colour emphasized by all the multitudinous greys, greens, soft blues and browns of foliage which can give such unfailing pleasure. Also there is charm in the variety of shape and form when different species are grouped.

The only time this garden can boast of "a blaze of colour" is in the autumn, when the Cherries, Azaleas, Cornus (especially *Cornus Kousa*), Acers, Stewartias, Hamamelis, and others are really brilliant if it is a good "colouring season," and of all, the most striking are *Cercidiphyllum japonicum* and *Disanthus cercidifolia*. A *Vitis heterophylla* with turquoise-blue berries, a common Vine ('Brandt,' I believe), and *Prunus Sargentii* are generally the first to colour, and the last, together with *Aronia arbutifolia* and *A. melanocarpa* have the most wonderful scarlets and crimsons. *Quercus coccinea splendens* is, I believe, almost the last to turn, but then it holds its leaves well into the new year.

That there are drawbacks to a garden without herbaceous plants or some of the bedding-out plants one knows most regretfully; this was emphasized by a visitor thanking us most warmly for showing her all the flowering shrubs and then adding, very eagerly, "And now won't you show me your *flower* garden . . ."

[The photographs (figs. 69-74) illustrating this article were taken by Miss SILVIA SAUNDERS of New York.]

OF SOME CANADIAN WILDINGS.

By VISCOUNTESS BYNG OF VIMY

As, alas, it was not possible at the Empire Exhibit at Chelsea to exhibit anything but a fraction of Canada's flora, the Editor has asked me for some notes on the subject. I have called them "Of some Canadian Wildings" because, as at the Show, so in these pages, only a small part of what Canada produces in wild flowers can be touched upon, and I am dealing with those that I saw, and must hope that perhaps it may stimulate holidaymakers to go out and see for themselves what this portion of the Empire has to offer in a prodigality that is unsuspected by those who have not had the good fortune to see it for themselves. Owing largely to Kipling's lovely name "Our Lady of the Snows," I am afraid a host of people are under the illusion that Canada is always snowbound. As a matter of fact Canadian summers are as hot as the winters are cold, and though over here we steal a march florally with Snowdrops, Aconites and Primroses, she has us "beat to a frazzle" when the year advances, for her flora is immense and marvellously varied, as it is bound to be with so wide a territory and such varying climatic conditions.

In 1921, when my husband was appointed Governor-General, I had the advantage of memories of early childhood when I spent a year in Eastern Canada, and therefore I did know about some of the flowers I could expect to see. But I was confronted by a very tangible obstacle to the serious study of the subject, because there was not then—and is not now, I believe—any Canadian-published book on the flora as a whole, and the best I could obtain was the State publication from New York of *The Flowers of New York State*, very kindly presented to me by that Government. That was all right, so far as it went, but it entailed keeping a watchful eye as to which flowers did and which did not cross the International Boundary into the Provinces of Quebec and Ontario. As a matter of fact most of them did. But regarding the Western flora it was more difficult, though I found F. SCHUYLER MATHEWS' *Fieldbook of American Wild Flowers* and MARGARET ARMSTRONG'S *Western Wild-flowers* both excellent publications, but they dealt, the latter especially, with plants indigenous also to California, most of which wandered no further north than Oregon. However, thanks to this little library, which was always beside my chair on our train, and from close personal observation, I got to know something about the plants.

Of course a gubernatorial life and that of a keen gardener are hardly compatible, and although everybody was most helpful there were ties and duties which handicapped one and prevented one's roaming at will off beaten tracks and paths in that wonderful country.

Five years, however, was a good time to work in, for I missed no opportunities, and by breaking away whenever I could, and at first keeping my nose glued to the train windows, I learnt a good deal as we sped across those thousands of miles of varied and beautiful country where one could escape from human society and find only bears, porcupines, ground-hogs, skunks, deer, and the other denizens of the land which I came to love so well. But to return to plants, much though I should like to write about the bears in Jasper Park, with their impertinent tricks of cadging for chocolates and breaking into camps for food.

There are, roughly speaking, five floral belts in Canada. The Eastern, the Western (or Prairie), the Foothills (in which you can include part of the Rockies), the Selkirk, and the Coast Ranges, not to mention the Maritime Provinces, where I believe there are places with a distinct flora of their own. Unfortunately my experience in the Maritime Provinces was, owing to various circumstances, limited to a single visit. Naturally there is no arbitrary dividing line between most of these belts, as there are endless incursions of individual plants, and the only case of a strictly limited range that I know is that of *Mamillaria microcarpa* and *Opuntia Rafinesquei*, found only in the region between Moose Jaw and Medicine Hat in Saskatchewan. Now people will say, How can tropical plants grow in a place where there are 30° to 40° below zero temperatures for weeks on end in the winter? And well may they ask that question! For though there is a thick blanket of snow in the winter, yet in spring, when everything is running with water, these Cacti emerge in a sodden mess, from which they recover; but why they do so I never could understand.

Now I want to begin with Eastern Canada—Ontario and Quebec Provinces—in spring, as that will give perhaps some idea of the unspeakable joy one felt at finding flowers almost before that unending snow had cleared off the ground in rushing torrents. In the East spring comes with a burst and races into summer almost before you have time to say “Spring at last.” The double windows of winter are replaced, almost on the same day, by the wire screens against flies and mosquitos, which are the curse of those lovely May–June weeks. Canadians declare that these pests die from the dry heat by the end of June. I wish I could agree, for I have never been such “insect fodder” as in those lovely woods about Ottawa—and not only in the spring, alas! Nevertheless what heavenly days I spent up the Gatineau Valley. When “pomping” became a weariness to my soul, our faithful Canadian A.D.C., WILLIS O’CONNOR, used to say “Time for a day up the Gatineau,” and away we went in his little car, before the by-roads were really passable, so that we sank at startling angles up to the running-board in mud, and were helpless till some farmer’s team dragged us out. Incidentally, Canada showed me what motors can stand up to in wear and tear, whether in the mud of the Eastern spring, or bumping over sun-baked prairies in summer on trips to outlying farms, whence I returned well battered and with bruises in every colour of the spectrum. But bad roads did not matter on



FIG. 73. PART OF THE VERANDA RETAINING WALL. LUCITY WOOD.



FIG. 74 THE VIRANDA COUPINARD AT FUGLEY WOOD

To face p 241

those gorgeous days, with the woods full of the mocking whistle of the blue jay or Whiskey Jack flitting past like a jewel, the fat American robins, and the small yellow birds like canaries, whose name I forget, and on the floor of the woods what treasures there were springing to life so quickly owing to the shortness of the season; for plants have to bustle about their jobs of blooming and setting seed with a positively indecent haste.

The harbinger of spring in Canada is that adorable but difficult plant *Epigaea repens* (Trailing Arbutus), which puts its nose out of the warm snow-blanket and carpets the ground with its leathery foliage and rose-pink fragrant blooms, fringing the edges of the lakes and creeping about in great mats. *Claytonia virginica* (Spring Beauty) comes next, its flesh-coloured blooms and sprawling succulent stems always reminding me of a Victorian lady with "the vapours" as they flopped helplessly on fallen tree stems and the mossy carpet of the woods, where generations of fallen trees have disintegrated into a soil such as gardeners find only in dreams—chocolate in colour, full of every form of humus and "delicatessen" desired of plants, and reminiscent in its consistency of first-rate Millefeuille pastry. No wonder the woods are carpeted with plants such as *Linnaea borealis*, *Mitchella repens*, *Pyrolas*, *Chimaphila umbellata* (Pipsissiwa), *C. maculata*, *Monotropa uniflora* (Indian Pipe), which with its pallid unhealthy blooms looks like a ghost growing on the roots of the Pine trees, and, when the seeds are ripe, suddenly drawing itself erect, flings them far and wide. *Monotropa Hypopitys* (False Beechdrops) is its first cousin and equally attractive in an eerie way. It is on the edges of the woodland that one sees the next hint of spring, in the tightly furled foliage of *Sanguinaria canadensis* with its blooms of a pearly white. The variety *flore pleno* was discovered during my time out there and by the merest chance survived. A school child gathered a bloom to which a small piece of root was attached. This the mother, more observant than most of her type, planted, and from that slender source came all that there is of this scarce plant. I was lucky enough to be given a piece, and it has now formed a respectable colony in the Thorpe garden. To keep the Bloodroot company come the pink, blue and white Hepaticas, their furry coats pulled up round their ears as they venture out into the cold spring air.

Violets follow in unbelievable masses of blue, purple, yellow, white, with blue predominating, so that the damp ditches, where they abound, look as though patches of sky had tumbled to earth. *Viola papilionacea*, *V. canadensis*, *V. pubescens*, *V. blanda*, *V. striata*, *V. lanceolata*, *V. pedata*, *V. palmata*, *V. palustris*, *V. sagittata*, *V. rotundifolia*, start in April and linger on to July, according to their species.

Other beauties of the woodland edges are *Tiarella cordifolia* (Foam-flower) and *Mitella nuda* (Naked Mitrewort). *Maianthemum canadense* (Canada Mayflower) fights it out with the invasive *Erythronium americanum* (Yellow Adder's Tongue) and *E. albidum*. The enchanting plants *Dicentra Cucullaria* (Dutchman's Breeches) and *D. canadensis* (Squirrel Corn) abound, and *D. eximia* adds a pink note to the

group, while *Uvularia grandiflora* and *U. perfoliata* wave above them. As regards the other Erythroniums, *Erythronium montanum* (Avalanche Lily) and *E. grandiflorum* (Easter Bells), they are Western plants and spangle the fields round Victoria.

Two early comers among the moisture lovers are *Arisaema triphyllum* (Jack in the Pulpit), that in early autumn adds its quota to the general colouring by clusters of scarlet fruits, and *A. Dracontium* (Dragonroot Arum), while *Symplocarpus foetidus* (Skunk Cabbage) covers the swamps with its great shiny leaves throughout the summer after the demise of the purple, green and yellow striped spathes that unfold themselves in spring. I confess to a liking for the smell, in moderation and in the open, for there is a pungency about it which is by no means unpleasant.

From April onwards it is impossible to say where spring ends and summer begins, for the flowers fall over one another in such profusion. I suppose *Calitha palustris* comes next in the procession, and though it has the same name as our Marsh Marigold, the petals are narrower the blooms smaller, but it is equally profuse in bloom. Under the high shade of Beech and Maple trees are masses of *Podophyllum peltatum* (May Apple), that always reminded me of a race crowd under a sea of umbrellas, owing to the droop of the foliage above the shy pink blossoms. Then come Anemones, from the pinched-looking blooms of *Anemone virginiana* (Thimbleweed) through the charms of *A. riparia*, *A. canadensis*, *A. quinquefolia*, to the fragile loveliness of *Anemonella thalictroides*, which I have never succeeded with in this country. Far and wide over the hard dry prairies in May are the Pasque-flowers in their velvet shrouds, ranging from deep purple to a pale grey colour. Before my first Western trip I had heard about the "crocuses" I should see, and vainly did I look for them, till I discovered that the Pulsatillas were meant!

Away in the mountains of Vancouver Island lives *Anemone occidentalis*, with great fluffy achenes, stolen, alas, as a rule before the seeds are ripe to line the nests of the whistling marmots that abound. I never saw these Anemones in bloom, but they are plentiful up Toby Creek and all round Paradise Mine, Vancouver Island, where I went with my old friend Mr. RANDOLPH BRUCE, at that time Lieut.-Governor of British Columbia, who was a plant enthusiast. That trip remains vividly in my mind, even after twelve years, not only for its loveliness but for the terror it inspired in my timorous soul. We started, with due dignity, from Government House in a car, and after an hour's drive exchanged it for the lorry that was used for bringing ore from the mine. Then the fun began. There was a narrow road—road by courtesy only—in reality a narrow ledge scraped out of the mountain with a precipitous drop on one side and sheer rock face on the other. I am no good at heights, so I shut my eyes, only to open them at shattering jolts, to find the lorry trying to negotiate a sharp bend. This was managed by shoving its nose into the bank, then backing it to the extreme edge of that crumbling road,

below which lay a sheer drop of many hundreds of feet, and then with another unseating jerk forward we generally rounded the bend !

I had been warned that it was not exactly a joy-ride, but that it could have been so alarming had not crossed my mind, nor was it very cheering, on one of these dreadful bends, to see the debris of a Ford car suspended in a bush. It had crashed on its way down from the mine one evening, and the unfortunate occupants were not found till next morning, one of them with both legs broken. But our lorry driver took it with a grin as a bit of bad luck. Personally I decided that no power on earth would get me down that mountain side on anything but my own feet : and walk it I did—seven long miles of steep hill—two days later, and what aching knees I had at the end of the trip ! Up and up we went to the timber-line, where whistling marmots misled one with their ventriloquistic stunts as they sunned themselves in the entrance to their burrows and called to their neighbours. The crowning climax to my terrors of that drive up was a thunder-storm on our arrival, and, as thunder-storms are at all times my undoing, I flung myself face downwards on a camp bed till it had rumbled its way into the distant mountains. Then I set forth to explore a land glittering with raindrops like winking diamonds on every blade of grass and plant, and such a mass of plants too, for a rushing stream ran down the mountain, forming the most perfect water garden that can be imagined. The ground was carpeted with *Empetrum nigrum*, *Phyllodoce empetrifomis*, *P. glanduliflora* and *P. Breweri* ; *Cassiope Mertensiana* grew in masses, and in the drier places *Drabas* and *Saxifraga virginensis*, while *Kalmia polifolia* added its rosy beauty to the scene, and the whole dry part of the mountain side was a mass of the *Anemone occidentalis* achenes waving in the fresh breeze that came across the snow-capped peaks above. The place was well named Paradise Mine ; I hated leaving it two days later, and would gladly have stayed for at least ten more, despite a distinct sketchiness of sanitation and a total absence of baths. But what do such things matter in a fairyland where the peace was unbroken by human sounds—for the miners were only audible early morning or evening as they came and went to the deep workings, too far under the surface for any clamour from them to interfere with the stillness and the content of the marmots and oneself. Often since then have I longed to find myself back there—but transported by air and not by that terrifying road !

A lovely plant that is widespread is *Aquilegia canadensis*. In England many plants are sold under that name which are not true. The real *A. canadensis* has a fairy-like appearance that is not found in others of the same family. *A. truncata* grows westwards, also *A. leptoceras*, which I found in Jasper Park and on high mountains. *Lupinus rivularis* comes from the same locality, and *Delphinium bicolor*, which I saw only rarely. Some people think the *Eschscholzia* is Canadian. This is not so—the original plants grew from seed sown round the Hotel Louise at Banff by the Canadian Pacific Rail-

way. Since then the *Eschscholzias* have naturalized themselves in that vicinity, but they are Californians and have no right to be spoken of as Canadian wildings.

Spiraeas there are in variety, chiefly in the West—*Filipendula rubra* (Queen of the Prairies) and *Aruncus sylvestris* (Goat's Beard); and in the East vast tracts of *Spiraea tomentosa* (Hardhack). *Phlox pilosa* is a native that most people know, also *P. divaricata*, and, most lovely of all, *P. Laphamii*, of which I have rarely seen a first-rate form in this country. Another lowly but beautiful, and maddeningly hard plant for England, is *Phacelia sericea*, the only one of its family to travel north, but for those who wish to see *Phacelias* in their glory California is the place, where they stretch for miles in every shade of blue and purple. *Dodecatheon pauciflorum* comes over the Southern boundary, and the only *Primula* I ever saw in Canada was *Primula mistassinica*—a poor little creature which I found in the Buffalo Reserve at Wainwright Park, and only got a glimpse of. Buffalos do not deal tenderly with humans—even harmless botanists—so one is not encouraged to loiter in their vicinity, and the armed rangers ride warily. There is a story of one of them who, being chased by an infuriated bison, galloped for his life and only reached the high fence just in time to dart through, whereupon an American tourist, oblivious of the inwardness of his speed, begged him to go back and let her take a snapshot of his performance! Of *Gentians* I met only *Gentiana crinita*, *G. puberula* and *G. Andrewsii*, but in no great quantities, in Quebec Province. Of *Clematis* there is *Clematis occidentalis* in British Columbia, and the Borage family provides *Lithospermum angustifolium* (Pretty Puccoon) and *L. multiflorum* in the yellows, and in the blue *Mertensia sibirica* (Languid Lady) is plentiful.

The *Mimulus* family is represented by *M. ringens* with small mauve flowers, and the lovely rose-pink *M. Lewisii* of the West which wanders down into California. *Lobelia cardinalis* is another Canadian not too persistent at home, though a lovely thing as you see it growing in ditches with *Chelone glabra*'s white blooms, Golden Rods, *Eupatorium purpureum* (Joe Pie Weed) and masses of *Woodwardia areolata* and other ferns.

The *Liliaceae* are well represented, beginning with the *Trilliums*, *Trillium erectum* (Wake-robin), *T. undulatum*, *T. grandiflorum*, *T. cernuum*, *T. recurvatum*, and the dwarf *T. nivale*, all belonging to Eastern Canada, *T. ovatum* being the only one I have seen in the West on the Coast Range; *Medeola virginica* (Indian Cucumber), *Veratrum viride* (Indian Poke or White Hellebore), *Allium canadense*, *A. tricoccum*, *Ornithogalum umbellatum*, *Hemerocallis fulva*, which I saw in the Maritime Provinces in great quantities, and of course the three well-known true Lilies *Lilium canadense*, *L. superbum* and *L. philadelphicum*. But can anybody grow the last either here or in Canada? Though you see it in masses as you travel westwards, a vivid scarlet in the grass where it is damp, lift it, and certain failure awaits you. Like

the American bison, it seems to be eternally untameable. In this same family come such lovely plants as *Smilacina racemosa* (False Spikenard), *S. stellata* (False Solomon's Seal), and *S. trifolia*, which is a charming but rather invasive little person at Thorpe. The pink-flowered *Streptopus roseus* (Twisted Stalk), and *Clintonia borealis* with its lily-of-the-valley-like foliage and nodding yellow blooms followed by berries of a wonderful blue in autumn, are both attractive, and the real Solomon's Seal also exists, but in a smaller form than the garden variety.

And now we come to the Orchid family, which ranges from the small *Microstylis uniflora* through *Liparis*, *Listera*, *Spiranthes*, *Epipactis*, to that most evilly disposed but enchanting plant *Calypso bulbosa*, and *Orchis spectabilis* (Showy Orchis), which I saw in only one part of Western Canada. This also applies to *Epipactis gigantea* (Stream Orchis), which I met at Fairmount Hotsprings in the Windermere Valley of British Columbia, where it grew in profusion beside the hot water rushing from the rocks, and with its feet set in a bed of a dwarf *Adiantum*, probably the one that is hardy in Cornwall. Of the *Cypripediums* I always find it hard to write calmly, for I love them so dearly, have hunted them so widely, and experienced such alternate moments of palpitating delight and shattering disappointment, that they bulk too largely in my memory for moderation in my feelings. Anything more exasperating than to locate these lovely plants I do not know. I have spent days in the woods and forests beside lakes that seemed ideal for them, yet never a sight of them was vouchsafed me: then quite suddenly one would stumble across them in all their glory among a tangle of luxuriant undergrowth beneath the high shade of the Hemlock Spruces that whisper in the summer breeze, and buzzing, alas, with masses of mosquitos and flies to whom one was a welcome meal. There the *Cypripediums* would be in big clumps, Partridge Berry (*Mitchella repens*) at their feet, or drifts of *Cornus canadensis* to throw up the beauty of their pink pouches, while the mad laughter of loons far out on the lakes rang through the silence of those lovely forests.

I well remember the first time I saw them growing. It was in the early summer of 1922, after one of those blissful but fruitless days up the Gatineau with WILLIS O'CONNOR. Though we had tried place after place, not a sign of the *Cypripediums* had we found, and we were, rather disconsolately, homeward bound over a bumpy by-road when coming towards us in the setting sunlight strode a man with a dead hawk in one hand and a mass of *Cypripedium Reginae* in the crook of his other arm. I hardly waited for the car to stop before leaping out and asking where he had found them. "Why, right here sure, in my own swamp," was the reply, and he led us to a half-cleared piece of boggy ground that he was taking into farm, and there grew the lovely things, seeming all the more adorable after our blank day. Since then many a batch of them has found its way from NAT PLATT's little farm to Thorpe, but I am afraid that the winter of 1936 wrought

havoc among them between the horrible weather and a plague of slugs that defied every form of poisoning.

C. parviflorum and *C. pubescens* grow in drier spots, while *C. acaule*—a most difficult plant over here—likes thin woodland and the shelter of Pine trees. *C. candidum* is a rarely found treasure in the West only, while *C. arietinum* (Ram's Head) is a native of the cold northern Quebec swamps and is by no means easy to handle. I lost the three plants I had, after flowering them for two years, and doubt if it can be found in any English garden—as a matter of fact it is more a thing of rarity than beauty or size.

While on the subject of Orchids, I have vivid recollections of a hunt for Calopogons and *Pogonia ophioglossoides*. On our westward journey one year I had marked down a lot of these plants in swampy ground between two stations near the entrance to the Rockies on the Canadian National Railway line, and was determined to have a try for them. I asked on the return journey for a halt of our train and the loan of a "speeder" between the two stations, whose names I have now forgotten. As ill-luck would have it, the day turned out as wet as it can only be in the Rockies when it has made up its mind to rain. The heavens just poured down their surplus moisture as we got to the spot, and I clambered on to the line wrapped in a "slicker," through which even mountain rain could not penetrate, and gum boots reaching high above the knee. To my horror I found that the superintendent of that portion of the line, who was travelling with us, felt it incumbent upon him to accompany me. He was large, elderly, and a "speeder" is just a wooden platform on wheels worked by a chugging little engine; it has a narrow plank seat with unprotected sides, and when the superintendent and myself were seated together there was not much space left, and I found myself clinging like grim death to the plank seat as we rattled round sharp corners. Never have I seen so self-sacrificing an official, or so sorrowful a one, as that poor, kind superintendent! He even clambered and slid down the precipitous railway embankment into the swamp where the plants grew, and I grubbed and struggled with the coarse grass that choked everything. No doubt he thought me quite mad and must have devoutly prayed that no other Governor-General's wife might be afflicted with the same form of insanity! Fortunately for him, or his successors, they have not been! It was great fun hunting for those plants, and I collected a nice lot and sent them to Thorpe; but, alas, they failed, and I imagine it is a question of the mycorrhizal fungus being absent at home. Being no botanist, I do not attempt to explain the failure.

Pentstemons in endless and beautiful varieties tumble in waterfalls of purple and blue among the boulders of the Rockies and Selkirks, where they tuck themselves into clefts of the rocks. *Houstonias* (Quaker Ladies) grow in damp meadows among the grass, and *Castilleja coccinea* climbs up the mountain sides, but that again is no use for English gardens until we can find exactly the plants it needs to grow upon. The Mints are represented by Bergamots in varying shades of

mauve, pink and the vivid red of *Monarda didyma*, while *Scutellarias* are widespread but not showy.

Of the wealth of ferns that fringe streams and lakes who can count their numbers and varieties, or say enough of the tiny denizens of the forests, such as *Linnaea borealis* (Twinflower), *Mitchella repens*, meekly neat and clinging to the ground, *Arctostaphylos Uva-ursi*, and the unending varieties of *Vacciniums* that colour the fading summer days and paint the far-stretching "Muskeg," where the rosy blooms of *Kalmia angustifolia* stretch for miles with *Ledum groenlandicum* (Labrador Tea, so called because in the early days pioneers brewed some sort of tea-like concoction from its leathery foliage). There, too, grows *Sarracenia purpurea* (Sidesaddle Plant) with all the little insectivorous *Droseraceae* clustered together at its feet, and the pure white cups of *Parnassia*, by no means an easy garden plant I have found, though it thrives in Northern England, *Rubus arcticus*, dwarf grey-foliaged Willows and *Betula glandulosa rotundifolia* are all in these swampy places, and earlier in the year the lake-sides are lit with blue torches of *Pontederia cordata*, while *Caltha palustris* chokes the water's progress in the streams, and ribbons of *Iris versicolor* make splashes of blue and purple loveliness. Dignity is given to these masses of flowers by the fronds of *Osmunda regalis*, *O. cinnamomea*, and *O. Claytoniana*, while *Dennstaedtia punctilobata*, Spleenworts and *Phegopteris* seek less moist habitats, and loveliest of all is *Adiantum pedatum* in great drifts up the Gatineau Valley, where it attains to 2 feet in height and when touched by frost turns a lovely silver before it droops and dies. Of mosses there are no end, and there is also the amusing *Lycopodium obscurum* (Club Moss), which is like a miniature Fir tree.

I often question, when I sit down and think of my many and distant wanderings about the world, whether there is anything more beautiful in its way than Vancouver Island with its forests, lakes, mountains, blue rivers, and, loveliest of all, the Malahat Pass during early summer when the *Cornus Nuttallii* bushes, 20 to 30 feet high, are white with their inflorescence, the polished crimson stems of *Arbutus Menziesii* stand out in glowing splendour crowned at every terminal with clusters of ivory blooms, while the ground is a torrent of golden Broom, the result of seeds originally brought out by home-sick Scotch farmers. High above all this beauty tower the Redwoods, the Hemlock Spruce and White Pine, while a well-engineered road winds round the edges of the mountains, and far below are azure glimpses of the Pacific Ocean where it eats and seeps its way inland. It is here that *Gaultheria Shallon* (Salal) reaches 8 feet or more in height, and among it grow patches of *Rhododendron canadense* and *R. albiflorum*, whose creamy blooms hang their heads and make a break among their more husky brothers. Creeping Wintergreens in the shape of *Pyrola bracteata* and *P. uniflora* (Moneses), that most entrancing but impossible little beauty of the woodlands, grow luxuriantly. Dodecatheons stand stiffly erect with their purple and pale rose petals laid back in a vicious expression.

North of the Malahat Pass up at Cowichan Lake and Cumberland are the Redwood forests, draped with the long hair-like strands of the lichen beloved of moose, while *Echinopanax horridus*, well named "Devil's Club," forms an impenetrable jungle with its thorny leaves and bunches of crimson berries in autumn. Alas, all the beauty of these forests is being sacrificed to pulp-wood. Mile after mile of tranquil beauty that one had loved one year was a scene of desolation the next, and it made one's heart ache to see the great trees being felled, torn up, and carted away to provide paper for the American Press.

With summer drawing to an end, we used to set our faces eastwards again—very regretfully so far as I was concerned—for to me the true Canada is that of the West with its mountains, rivers, wheatfields and rolling landscape. As one turned towards Ottawa the autumn pageant began: meadows packed with Asters, of which more than fifty are botanically named, including the *Aster novae-angliae* and *A. novi-belgii* types. Solidagos—Canada's official flower even as the Maple Leaf is her traditional emblem—possess over twenty-two named species, ranging from the dwarf *Solidago bicolor* to the waving 5-foot plumes of *S. canadensis*, that one sees helping to create a natural herbaceous border with *Chelone glabra*, *Liatris spicata* (Kansas Gayfeather), *L. scariosa* (Blazing Star), *Monardas*, *Eupatorium purpureum* (Joe Pie Weed), *Rudbeckias* bronze and gold, while in those terrible areas where forest fires have swept the country stretch miles of tall *Epilobium angustifolium*—Fireweed as they call it, because it is the first plant to hide the ravages of those forest fires which remain in one's mind as a nightmare. I remember seeing the whole of one side of the beautiful Illiciwat Valley a mass of flames, trees crackling into flaring torches and crashing to the ground, and there was the horror of knowing that not only were the trees and plants being devastated but that countless helpless little animals were being trapped and burnt to death in the raging inferno, and that for generations to come there would be gaunt blackened trees holding up protesting arms to heaven from a carpet of rosy *Epilobium*.

And then come the wheatfields, stretching as far as the eye can see to the softly rounded foothills. The harvest is completed when the first kiss of frost adds new beauties to the Canadian scene, and the Maples are crimsoning, the Poplars taking on golden or burnished gilt tints, the Birches lending a tender silvery colour, the *Vacciniums* aflame in the Muskeg, and autumn sweeps down almost as swiftly as spring. Who could say which is the most lovely of the Canadian seasons, where all are so magnificent? But autumn means the approach of snow, when floral death stretches over the land, so that to me, anyhow, even the beauties of that season were sorrowful, despite sunny days, blue skies, and those brilliant nights when the moon traces a lacework of sharply defined tree shadows on the snow, and the Northern Lights flash across the vast vault of the sky. But none of these things, lovely as they are, could ever atone for the absence of the Canadian wildings that one knew and loved.

GESNERIACEAE, HARDY AND HALF-HARDY.

By J. W. BESANT, Glasnevin.

THE family Gesneriaceae contains many valuable garden plants, a number frankly of indoor value only, some perfectly hardy, and others perhaps on the border-line : the last can usually be successfully grown in the alpine house, or in any structure from which frost can be excluded.

Ramondia is perhaps the best-known genus and one that has been highly esteemed for many years. The genus is named in honour of M. RAMOND, a French botanist, who published an account of a journey he made in the Pyrenees at the beginning of the last century. *Ramondia Myconi* (*pyrenaica*), the best-known species, is reputed to have been introduced from the Pyrenees prior to 1640. It is well figured in the Botanical Magazine, t. 236 (1794), as *Verbascum Myconi*, and in the accompanying text it is stated to have been cultivated by MILLER in 1731, and probably before that by PARKINSON. The plant is so well known as scarcely to require description. The rosettes of leaves lie prostrate and may measure 6 to 8 inches across, the leaves in two or three series are hairy on both surfaces, rugose, the margins deeply and irregularly toothed and ciliate. The flowers produced on scapes 6 inches or more high arise from the centre of the rosette and usually bear from three to four or five flowers each on its own stalk. The corolla of usually five lobes united at the base is pale mauve : a well-flowered group of *Ramondia Myconi* is a delightful picture in early summer.

Seeds are produced freely and grow easily in very little heat. Some variation has occurred, though not much considering the prodigality of seeding, and pink and white varieties are known. *R. Myconi rosea* and *R. Myconi alba* are both occasionally offered : some forms of *rosea* are deeper than others, and most of the *alba* forms I have seen have had a suspicion of pink in them—all, however, are good plants. The pink and white varieties must be propagated by division or by leaf-cuttings in sand.

While *R. Myconi* occurs only in the Spanish peninsula, one or two other species are found in the Balkans and on Mt. Olympus. *R. serbica* (Bot. Mag., 8765) was discovered in southern Serbia by PANCIC, and subsequently in Albania as well as other parts of Serbia. It is generally smaller in all its parts than *R. Myconi* and has fewer flowers to each scape. The lobing is irregular, some flowers having four petals, others six. The leaves are arranged in similar rosulate fashion, hairy and irregularly toothed. The corolla is lilac, the anthers blue, differing thus from *R. Myconi*, in which the anthers are yellow. The figure quoted above was prepared from a plant grown at Glasnevin. *R. serbica* var. *Nathaliae* has been regarded by some botanists as a distinct species, but in the Kew Hand List is retained as a variety.

It differs in the leaves, which are described as ovate, tapered equally to base and apex. The late C. F. BALL describes the flowers as more deeply coloured than those of *serbica*, while FARRER, who gives *R. Nataliae*, as he calls it, pride of place, describes the colour as brighter lilac-blue than *R. Myconi*; as a matter of fact, mauves, lilacs, purples and blues are almost impossible to describe, notwithstanding colour charts.

R. Heldreichii (fig. 75) or *Jankaea Heldreichii*, of BOISSIER, is a fascinating species from Thessaly. It has long been known to botanists, and occasional specimens were known in cultivation for many years, but it was only in a very few gardens that it persisted. Recently it has been introduced in fair quantity, and with a better knowledge of its requirements and a keener appreciation of rare plants it promises to become more generally known. The rosettes of leaves are usually smaller than those of the other species, the lower ones closely pressed against the substratum, the upper and inner more erect, particularly when the plants have reached the flowering stage. They are thickly furnished above with many white hairs, giving them quite a distinct appearance; below there is a felt of brown hairs. The flowers produced on scapes arising from among the central leaves are lavender or lavender-blue, the corolla of 4 or 5 segments united into a longer tube than in the other species of *Ramondia*.

With the exception of the last species, the *Ramondias* are easily grown and propagated. Seeds as noted above form a ready means of increase, with division and leaf-cuttings for special varieties. A moist soil and shade, according to locality, are necessary, and to prevent lodging of water in and on the leaf rosettes vertical planting in crevices is desirable. Here in Ireland with less brilliant sun, planting in a northern aspect is not so essential. *R. Heldreichii*, with its felt of white hairs, is particularly difficult to keep in the open, even when protected from direct overhead moisture. It flourishes, however, in pots or pans in the alpine house, where it increases freely by offsets and flowers abundantly. At Glasnevin we have not yet obtained seeds from pot-grown plants.

Haberlea is closely allied to *Ramondia*, but differs in the form of the inflorescence, which is inclined to umbellate, the scape, 6 inches or more long, bearing at the summit four or five flowers or fewer. The corolla also differs in having a longer tube; the limb or expanded portion, divided into five segments, of which the two upper are smaller, is thus rather oblique as opposed to the rotate form in *Ramondia*. The leaves are oblong, tapered to the base, coarsely toothed, and hairy on both surfaces. The covering of hairs is less dense than in *Ramondia*, hence the leaves look much greener. Two species are known, namely, *Haberlea Ferdinandi-Coburgi* from Bulgaria and *H. rhodopensis* (fig. 76) from the Balkans. The latter is the better known and one of the choicest plants for the rock garden. Planted vertically like the *Ramondias* in moist soil, facing north if possible, they flourish exceedingly, making fine leaves and flowering abundantly; the flowers are lilac and continue in bloom considerably longer than those of *Ramondia*.

H. rhodopensis alba is presumably the plant formerly known as *H. virginalis* (fig. 77). Here it is smaller in all its parts than *H. rhodopensis*, but the pure white flowers when freely produced are of great charm. *H. Ferdinandi-Coburgi* differs in the shorter leaves, rounder at the apex, broader in proportion to their length, in the shorter tube of the corolla and less oblique limb, giving the flower a rounder form; colour light lilac.

The Haberleas grow freely from seeds, except the white variety, which here at least does not seed freely. They can all be divided and can also be propagated by leaf-cuttings in sand.

Conandron ramondiioides, a native of Japan, is among the doubtfully hardy members of the family. It was apparently introduced by the famous Veitchian firm nearly 60 years ago, and was described at length by Dr. MASTERS in the Gardeners' Chronicle of 1879, p. 232. It is also figured and described by Sir J. D. HOOKER in the Bot. Mag., t. 6484. In this case the root-stock is tuberous, the top of the tuber being furnished with brownish hairs. The leaves, usually few in number, vary in size according to cultivation. They may be 4 to 6 inches or more long, stalked, rugose, not so coarsely toothed as in *Ramondia*, without hairs and with deeply marked veins. The flower scape, which is hairy, arches over the leaves, forking at the apex into a cymose umbel of 6 to 12 flowers. The spreading five-lobed corolla is pale lilac to almost white—in fact, a white variety is in cultivation. The figure in the Bot. Mag. depicts the flowers as white, although the form commonest in cultivation is distinctly lilac. Recently another species, or perhaps variety, has appeared, namely, *C. leucanthum*, but of its status and behaviour I cannot at present speak. *C. ramondiioides* has been tried in the open at Glasnevin but never became established; it is happiest in the alpine house and even enjoys a little artificial heat. A compost of sandy loam, peat and leaf-mould suits it admirably, guarding against over-watering in winter.

Other herbaceous Gesnerads represented here include *Briggsia amabilis*, *B. Agnesiae*, various species of *Didissandra* still under number, and *Oreocharis (Roettlera) Forrestii*. These genera have been revised and fully dealt with regarding their botanical affinities by the late Professor CRAIB in Notes from the Royal Botanic Gardens, Edinburgh, vol. xi.

Briggsia was named in honour of MUNRO BRIGGS SCOTT, M.A., B.Sc., a former Assistant in the Kew Herbarium, who unfortunately lost his life in the battle of Arras, 1917. The only species attempted in the open at Glasnevin was *Briggsia amabilis* var. *taliensis*, which lived in the rock garden for several years and produced several pale yellow flowers, the corolla larger than in most of its allies, expanded above the middle of the tube, pale yellow in colour. It gradually dwindled, however, owing as much, perhaps, to unsuitable soil and position as to cold. It is easily kept in pots in a cool house. *B. Agnesiae* has lingered in a pot for some years, but does not increase and has never flowered here. It forms a rosette of hairy ovate leaves, which I have not seen at their maximum development. The flowers

are described as deep crimson. It is the *Didissandra Agnesiae* of G. FORREST.

Oreocharis Forrestii (*Roettlera Forrestii*) (fig. 78) has been in cultivation at Glasnevin for many years both in a cold house and on the rock garden, where it lives under the same conditions as *Ramondia* and *Haberlea*. *Oreocharis*, as pointed out by SKAN, differs from its near allies in the four free (not coherent) fertile stamens. *O. Forrestii* forms flat rosettes of hairy, ovate, blunt, irregularly toothed leaves. The flower scapes produced from the centre of the rosette rise to a height of 2 or 3 inches, producing at the top a cymose umbel, the whole furnished with glandular hairs. The corolla is pale yellow, tubular, the tube slightly contracted beneath the spreading lobes. The flowers are at first somewhat pendulous, becoming more erect as the fruit matures. Seeds are produced freely, particularly if hand-pollinated. They germinate readily under the same conditions as *Ramondia*, *Haberlea*, etc., and good flowering plants can be grown in two years. They should be sown in a light sandy compost, merely covering them with a little fine sand. A warm house is preferable to start them in, and they should be kept in a house lightly shaded during the summer for the first year, thereafter they may be grown in a cold frame or the alpine house. *O. Forrestii* is figured in the Bot. Mag., t. 8719, and in the Gard. Chron., vol. lviii, p. 279, as *Roettlera Forrestii*. It is one of GEORGE FORREST'S introductions from N.W. Yunnan when collecting for Messrs. BEES, and is a remarkably attractive member of the Gesneriaceae.

Mitraria coccinea is a shrubby Gesnerad, hardy in mild localities. It has lived in the open at Glasnevin for a number of years, but is not so happy as in more favourable districts. When happy it is a charming shrub and should be tried wherever there is a reasonable chance of success. It is of spreading habit, climbing when near a suitable support, the stems clothed with opposite, shortly-stalked, ovate, coarsely-toothed leaves. The flowers are produced singly from the leaf axils, each on a long stalk. The corolla is tubular, constricted at the base, expanding upwards, the lobes spreading, scarlet outside, yellow within. It is a native of the Island of Chiloe and easily propagated by cuttings in sandy soil.

Sarmienta repens is related to *Mitraria*, but differs in having two perfect stamens as against four in *Mitraria*. It is a humbler plant of low spreading habit, leaves smaller, ovate, blunt and rather fleshy. The flowers, as in the last named, are pendulous on stalks an inch or more long, the corolla scarlet, constricted below and also just beneath the lobes which are erect or very little expanded. *Sarmienta* is well known as a greenhouse plant, but I have no experience of it in the open. It comes, however, from Chile and Chiloe, like *Mitraria*, and from the same regions we have *Berberidopsis corallina*, *Philesia buxifolia*, *Lapageria rosea* and *Tricuspidaria*, all of which are to be found in the open in suitable localities. Hybrids between *Mitraria* and *Sarmienta* have been raised here, some of them distinctly intermediate but none showing any improvement on the parents.

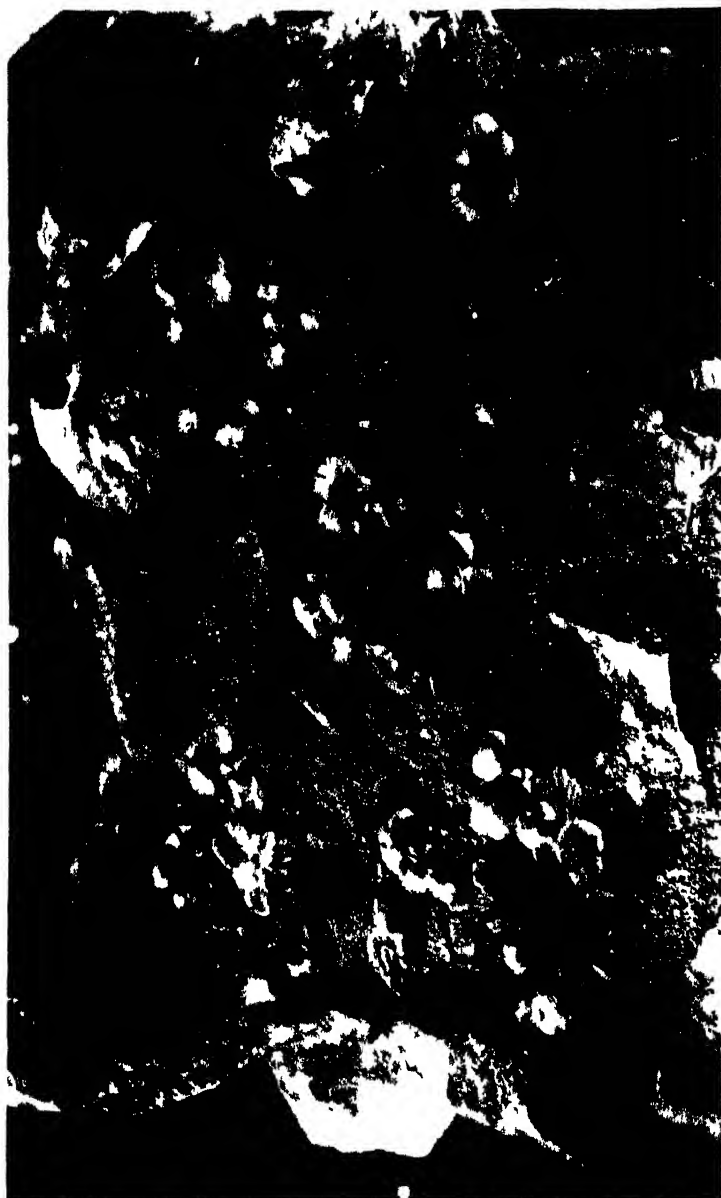


FIG. 75.—RAMONDIA HELDREICHII AT GIANNIVIN

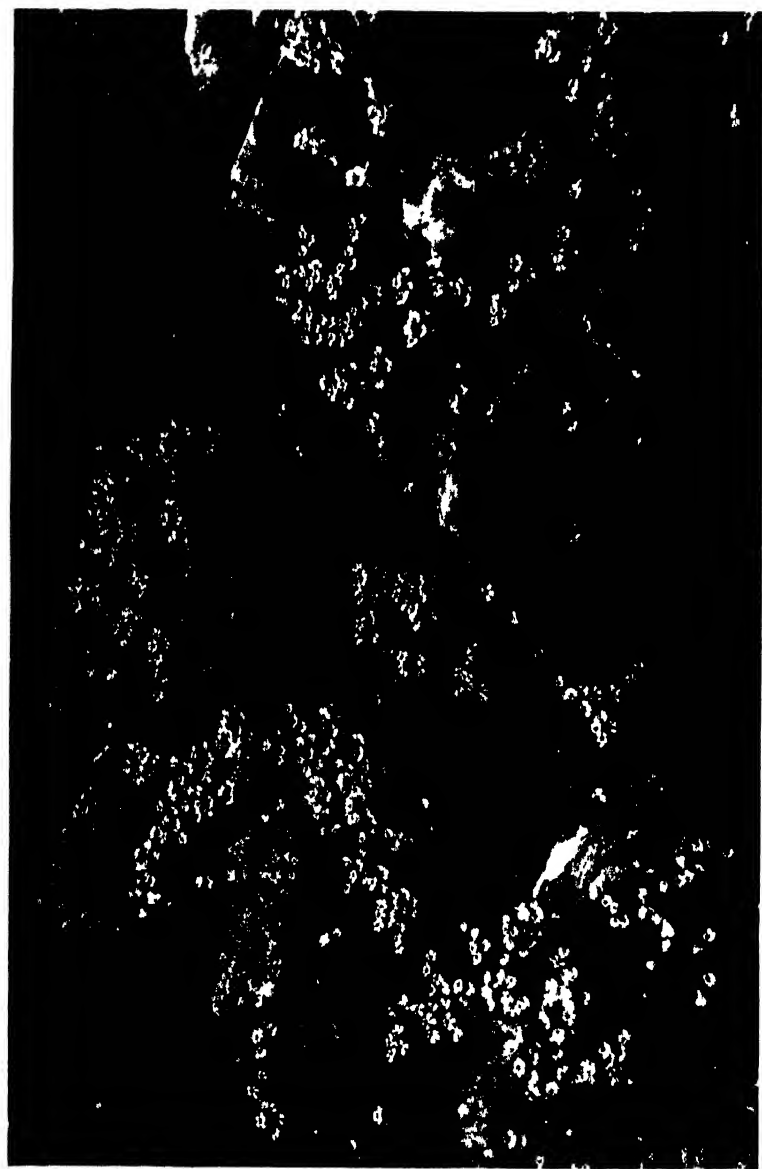


Fig. 7. HABERIA RHODOIENSIS AT GLASSLIN



FIG 77 HABITAT VIRGINIENS AT GILSENEN



FIG. 75.—*OREOCHARIS FORRENTII* AT GLASNEVIN

To face p. 253

MASTERS LECTURES, 1936.

THE POTATO IN ITS EARLY HOME AND ITS INTRODUCTION INTO EUROPE (*cont. from p. 162*).

By REDCLIFFE N. SALAMAN, M.D., F.R.S.

THE INTRODUCTION OF THE POTATO INTO EUROPE.

THAT the potato found its way into Europe towards the end of the sixteenth century, and that two different varieties were introduced, or at any rate existed in Europe in 1596, is common knowledge. The writer * has shown that our existing sorts, with their wide range of variety in colour, shape, maturity, taste and disease-resistance, could all have been derived from these two original sources. Three points of interest arise which demand our consideration :

(a) When did the potato arrive in Europe, and to whom, if any, can the credit of its introduction be ascribed ?

(b) Whence did the potato come to us : was it from Peru, including Bolivia, or from Chile, including the island of Chiloe ?

(c) In what form was it brought to Europe : by true seed, or by tuber ?

Before attempting to answer these questions we must take stock of the existing data on the subject.

In the *Historia Plantarum* of CLUSIUS, published in 1601, he describes the potato in detail and says : " The first mention I have of the plant is by PHILIP DE SIVRY, Lord of Walhain and Prefect of the city of Mons in Hanonia (Hainault) in Belgium, who sent to me at Vienna in Austria towards the beginning of the year 1588 the tubers of it with fruit (berries). . . . He wrote that he received it from a certain friend of the Papal Legate in Belgium under the name *Taratouffli* (Italian = truffle). I caused a picture to be made from the living plant with two plates, the one representing flowers and fruit, the other roots and tubers." He continues, " Where the Italians first obtained it they do not know, but it is certain that they got it either from Spain or from America. But it is to be wondered at that notice of the plant came so late to us although it was so common and frequent in certain places in Italy, as they say they used to eat the tubers of it cooked with mutton in the same way as turnips and roots of carrots. They actually devoted it to fodder for pigs ; but this is more wonderful that it was unknown at the school of Padua before I sent tubers of it from Frankfurt to friends who were studying medicine at Padua.

" But now it has become sufficiently common in many gardens in Germany since it is so fecund.

* SALAMAN, R. N. *Potato Varieties* (1926).

"But there is no doubt that it is the plant which PETRUS CIEZA describes. . . ." And here follows CIEZA's classic description of the potato under the name of Papas which he first encountered in Popayan in Colombia.

From this we learn that prior to 1588 the tuber was an established garden vegetable in certain parts of Italy, which implies that it must have arrived there from Spain at least five or more years earlier, and that it could not therefore have reached Spain much later than 1580. This, however, is but guessing, and till now 1588 has been our earliest fixed date.

It gives the writer great pleasure to state that, with the help of Professor E. HAMILTON, he is able to improve on that date by fifteen years. In his book HAMILTON* mentions that the account books of the Hospital de la Sangre at Seville show that they bought potatoes as part of their normal housekeeping in 1576. Recently Professor HAMILTON has written that he found mention of such a purchase in the fourth quarter of 1573, and thinks there may be still earlier ones.

It is interesting to note that prior to 1584 the hospital bought its potatoes by the pound, but that at the later date they were purchased by the arroba (a unit of 25 lb.); moreover, all the purchases took place in the fourth quarter of the year, which is good evidence that they were grown in Spain and eaten freshly harvested. They were probably regarded as luxuries up till 1584.

The new evidence allows us provisionally to put the date of introduction into Spain at least as early as 1570, thus allowing three years for its multiplication to the stage when it could be marketed profitably, and this means that the original seed tubers must needs have been gathered in South America in the previous year, 1569.

Mention, however, must be made of an interesting statement made by MELLADO in his *Diccionario Universal*, published in Madrid, 1854, which runs as follows :

"The Catholic king PHILIP II paid homage to the pope, perhaps on account of the resemblance in the name, with some of these tubers which the Spaniards at that time brought to Europe from America, which, thanks to certain tonic properties which were attributed to them, were to restore the health of the holy father. He divided the King of Spain's gift with a valetudinarian cardinal who was at that time legate in the Netherlands and this cardinal in his turn, also by way of medicine, gave some of these tubers to PHILIP OF SIVRY, governor of Mons, calling them 'tartufoli,' by which name they were known in Italy for a long time.

"Finally in 1638, PHILIP OF SIVRY sent two of these 'tartufoli' to the celebrated French botanist LÉCLUSE, who at that time lived in Vienna. Instead of eating them LÉCLUSE planted them and was the first man who in his *Rariorum Plantarum Historia* described the

* HAMILTON, E., "American Treasure and the Price Revolution in Spain, 1501-1650," *Harvard Economic Studies*, XLIII, p. 196, note (1934).

vegetable which he had obtained in this way, in which he immediately found some resemblance to the pistachio of the ground."

MELLADO is obviously in error when he states that the tubers were given to LÉCLUSE in 1638, seeing that the latter died in 1609 and that he received his tubers in 1588. Moreover, GERARD, not CLUSIUS, was the first to publish a description of the new plant. Although MELLADO's original statement has recently been reproduced abroad as an "historically proved fact," and the date 1565 ascribed to it, no evidence whatever of its truth has been advanced, unless it be the fact that Pope PIUS IV. died in December of that year. The chief archivist of the Vatican has been kind enough to investigate this problem and has informed the writer that after a lengthy research he has been unable to find any evidence bearing on the matter. One can only say that 1565 is a not unlikely date for the introduction of the potato into Italy via Spain and would account for CLUSIUS's statement that in some parts of Italy it was already in 1588 being used as cattle fodder.

So much for the first introduction.

The second is recorded by the English herbalist GERARD, who was so proud of possessing this plant that in the portrait frontispiece to the first edition of 1597 of the *Herbal* he is seen holding a sprig of the plant, with its flower and berry. Already in 1596 he had mentioned the potato in his *Catalogus Arborum*. But it is in the *Herbal* that he describes it, and in the following words tells us how he got it: "It groweth naturally in America, where it was first discovered as reports C. CLUSIUS, since which time I have received roots hereof from Virginia, otherwise called Norembega, which grow and prosper in my garden as in their native country."

This sentence has puzzled all plant historians and will probably continue to do so. In the first place there were no potatoes native to Virginia and none were cultivated there till some 120 years later: so much is certain. To regard GERARD as a mere liar would be unjustified, though his biographer, JACKSON, complains that "he was inaccurate to a degree and ignorant." It is not improbable that he muddled the new plant with some Virginian ones he had lately received; this is the more likely because CLUSIUS, in his description of the potato, says that: "They are not wholly dissimilar to the Virginian roots called Openauk." GERARD tells us that he was in touch with CLUSIUS, and he may well have submitted the Openauk tubers to CLUSIUS for identification. In any case, the last opportunity for anything to have come to GERARD from Virginia was in 1586, when DRAKE brought back the first settlers, amongst whom was HARIOT, the scientist, who appears to have brought with him a collection of plants, amongst which was the Openauk.

If we excuse GERARD from any deliberate attempt to mislead, it would not be unfair to suggest that he was so excited about the plants he got from HARIOT that he thought the potato, which may have reached him at much the same time, also belonged to the Virginian

collection. This theory at least gives us a probable date, viz. 1586, for its arrival in GERARD's hands. His statement in the Herbal does at least allow us to conclude that his potato was not derived from that of CLUSIUS, but independently acquired from America.

We may also assume from his statement that "it grows and prospers in his garden," that he had had the plant under observation several years before he published his Herbal (1597). This precludes the possibility of it being derived from any tubers RALEIGH might conceivably have brought back in 1596, on his return from the Guiana expedition.

This still leaves the source of GERARD's potato unaccounted for. One obvious suggestion is that he obtained them from DRAKE, who prior to the rescue of the Virginian settlers had been raiding some Spanish galleons and towns on the mainland and in the West Indies, notably Cartagena in the north of Colombia. Here DRAKE stayed six weeks, during which time he collected his loot and laid in stores, amongst which might well have been potato tubers, and possibly he gave GERARD some at the same time as the latter obtained the Virginian plants. This suggestion cannot be proved, but it is worth noting that HARIOT's party had laid in stores at Hispaniola in 1585 before reaching Virginia, and that DRAKE left Cartagena on March 30, and after picking up HARIOT and the Virginian settlers, reached Plymouth on July 26, 1586. These later dates would have allowed for the successful planting in England of potato tubers should he have brought any with him. The fact that CLUSIUS, who was on friendly terms with DRAKE, and stayed with him in 1581, makes no mention of the potato in England at that date, is evidence that DRAKE had not introduced it at that time.

DRAKE had come across the potato in the Isle of Mocha off the coast of Chile on November 28, 1577, on his tour round the world and had probably then recognized its value as ship's stores. If DRAKE did play a part in its introduction to Great Britain it was probably an unconscious one in collaboration with Sir WALTER RALEIGH, who may equally have had no foreknowledge of the great importance which this new food source was to have.

Although legend has never ceased to link RALEIGH's name with the introduction of the potato, amongst scientific workers there has been a growing tendency to deny him any credit in the matter. This is mainly due to the influence which SAFFORD's excellent treatise, *The Potato of Romance and Reality*, has exerted. SAFFORD pointed out that RALEIGH never went to Virginia, and that if he had he would not have found the potato there. He also called attention to the fact that the charming tale of RALEIGH and his gardener at Myrtle Grove was retold 120 years ago—*mutatis mutandis*—of DRAKE, by the German scholar, PUTSCHÉ.* In a second version of the legend RALEIGH is supposed to have brought the tubers from Quito but, here again, SAFFORD points out, he never was within a thousand miles of the spot.

* C. PUTSCHÉ. *Versuch einer Monographie d. Kartoffel, etc.*, Weimar (1819).

So recently as April of this year Professor MURPHY of Dublin, a distinguished authority on the diseases of the potato, dismissed as purely legendary the supposed connexion between RALEIGH and the potato.

In the writer's opinion there is much to be said for the theory that RALEIGH was instrumental in introducing the potato into Great Britain. We have seen that the potato could not have been in England before CLUSIUS's visit here in 1581, and that in 1586, when DRAKE brought back RALEIGH's colonists from Virginia, it was quite possible that DRAKE gave HARIOT potatoes from the ship's stores which he had raided from Cartagena or from ships which, after re-victualling there, he had captured on the high seas. Potatoes had come to be used regularly as stores on Spanish ships about 1580, and when CAVENDISH visited St. Mary's Isle near Concepción in Chile in 1587, he found potatoes in crates ready in the storehouses against the coming of the Spanish ships.

HARIOT, after he reached Plymouth on July 28, 1586, would doubtless have shown these tubers, together with his Virginian plants, to his patron RALEIGH, and to GERARD.

Late in 1586 RALEIGH received a grant of lands in Cork and Waterford, which included property in Youghal, and it was in that town he took up his residence in 1587 or at latest in 1588. In this latter year he acted as Mayor of the town. There is therefore no reason to doubt that RALEIGH could have caused tubers to be planted in his garden either in the latter part of 1586 or in the spring of 1587, and that if he did not plant the actual tubers which HARIOT presumably gave him, he could have obtained some from GERARD's garden in the Strand.

There is considerable evidence for believing that the potato was introduced into this part of Ireland at a very early date. In 1640 potatoes in S. Cork were known as "Crockers," a name said to be derived from Croker's field at Youghal, where they were said to have been first planted, although neither written record nor the evidence of tradition can be produced in support of a "Croker's" field at Youghal. However, in the neighbouring town of Mallow in Cork there is a field which for the last hundred years has been known as "Croker's Garden," According to Miss MARY AHER it is a custom in Ireland to call a potato after the name of the immediate grower. The CROKER of that day, rather than his field, may have been so honoured. To Miss AHER the writer also owes his thanks for information concerning the CROKER family. It appears that a certain RICHARD CROKER came to Youghal in 1602 in the company of Sir ROBERT BOYLE, and that he occupied the parcels of land called Norries and Aughundun respectively. Descendants of RICHARD CROKER played a considerable part in the life of Youghal during the seventeenth and early eighteenth century. If it be true that as early as 1640 the CROKER of his day was notorious for the growing of potatoes, it is not improbable that the family may have been carrying on potato cultivation from the time they originally

occupied the land which once had belonged to RALEIGH, and what more likely than that they obtained seed from RALEIGH himself?

In 1662, when the Royal Society was considering the advisability of encouraging the cultivation of the potato throughout England, they turned to ROBERT BOYLE as the person most conversant with the new plant, for a supply of seed from his estate at Youghal, which the BOYLE family had acquired from RALEIGH in 1602. On April 8, 1663, BOYLE's gardener at Youghal wrote a long letter describing in great detail the cultural methods to be applied to the potato. He was evidently regarded as the expert on potatoes.

In 1684 ROBERT LEIGH writes that in Wexforde, near Youghal, potatoes formed the main food supply of the poor.

In 1693 Sir ROBERT SOUTHWELL reported to the Royal Society that "His grandfather brought potatoes into Ireland, who had them from Sir WALTER RALEIGH after his return from Virginia." Sir ROBERT's paternal grandfather, according to the D.N.B., was ANTHONY SOUTHWELL, who came to Munster as a planter in the reign of JAMES I, and would thus have had an opportunity of acquiring seed potatoes from the stock which RALEIGH might have left at Youghal but which, as we have seen, could not have come from Virginia. THOMAS SOUTHWELL, of Brancaster in Norfolk, who perhaps is the same individual, in 1597 obtained legal possession of a moiety of the property known as the Warden's House, which was part of the New College of the Blessed Virgin, Youghal. According to HAYMAN,* RALEIGH lived in the same house which later became known as Myrtle Grove. ORPEN† maintains that RALEIGH never occupied the Warden's House, nor indeed obtained legal possession of it till 1602, when he at once sold it to BOYLE; but is of opinion that he built and occupied the existing "Myrtle Grove," in the garden of which tradition states the first potatoes were grown.

An old doggerel which G. M.‡ (? GEORGE M. MOORE) records, testifies both to the strength of the RALEIGH and Youghal traditions:

"By Raleigh 'twas planted at Youghal so gay,
And Munster potatoes are famed to this day."

The RALEIGH tradition cannot be separated from that of Youghal as the spot where the potato was first grown, and as the evidence for the latter is considerable it seems unreasonable to dismiss the former as mythical. Till a better claimant be found, the credit of being the first to grow the potato as a food plant in Great Britain remains with RALEIGH.

If historical research has failed to identify with certainty any one person to whom may be ascribed the honour of its introduction either to the Continent or to Great Britain, in Germany public opinion has

* HAYMAN, S. "Ecclesiastical Antiquities of Youghal," J. Roy. Soc. Antiq. Ireland, vol. iv, p. 25 (1856).

† ORPEN, G. H. "Raleigh's Home at Youghal," J. Roy. Soc. Antiq. Ireland, vol. 33, p. 345 (1903).

‡ Cork Historical Soc., vol. 26, p. 56 (1920).

"plumped" for DRAKE, and in Offenburg, in Baden, a statue has been erected to him.

The history of this monument is told by SAFFORD,* and with greater detail by REDDICK.† The sculptor, ANDREAS FRIEDRICH, 1798-1877, made it on the chance of selling it to a Strassburg magnate but, not succeeding in getting his price, he gave it to the City Fathers of Offenburg on condition that it should be erected with its back towards Strassburg, which was duly done in 1853. The monument, whose plinth is decorated with a frieze of potato tubers, bears the following inscriptions on its four sides, which, translated, read :

"Sir FRANCIS DRAKE, who spread the use of the potato in Europe, A.D. 1586."

"Millions of people who cultivate the earth bless his immortal memory."

"The precious gift of God serves the poor as a help against famine and alleviates bitter want."

"The gratitude of the town of Offenburg is due to the sculptor and giver of this statue, ANDREAS FRIEDRICH, 1853."

The next problem is, did the potato which reached Europe in the sixteenth century come from Peru and Bolivia, or from Chiloe and its neighbourhood? The Russians contend for the latter thesis and go so far as to say that the former is unthinkable. The writer's opinion is the reverse of this. Let us look into the matter from the historical point of view. No journey was made from Chile direct to Europe via the Magellan Straits till 1579, so it could not have come that way, even had SARMIENTO not been completely cleared out of stores before he left the Straits. It could not have been taken from South Chile till that part of the country was reached by MENDOZA in 1559, when Chiloe was first sighted. This island was not occupied, however, till 1565. From 1559 till 1565 there was ceaseless warfare between Spaniard and Araucanian on the mainland north of Chiloe, and no real progress was made southward although the Spaniards founded the town of Valdivia over a hundred miles to the north of Chiloe in 1553. From 1565 onwards their hold on the country was tenuous in the extreme, fighting for every inch of land, losing it one day to recover it the next; the war continued till 1568, when, after a disastrous defeat, the Spaniards called a truce which lasted till 1572. In 1570 occurred the great earthquake which destroyed Concepción and most of the southern settlements. From 1572 the fighting was spasmodic, but taken up in earnest again in 1576. After 1576, internecine warfare broke out again and lasted off and on for the next two hundred years; but Spain already had the potato growing and the patients of the Sangré were enjoying them in 1573.

The potato apparently did not appeal to the Spanish conquerors in Chile as a food substitute during VALDIVIA's leadership, 1541-54.

* SAFFORD, *loc cit.*

† REDDICK, D. *Jour. Heredits*, vol. xx, p. 173 (1929).

In a letter to CHARLES V, dated 1551, VALDIVIA mentions the potato as one of the crops grown by the natives, yet when his own forces were in the direst want of food, and the daily ration measured by a few score grains for each man, neither at that time nor later when he grew crops of maize and wheat for his army's needs, does he make mention of the potato.

It is not claimed that it was impossible for a man to have put a potato in his pocket in Chiloe and to have brought it back to the more settled country in the north during this period, but it was, to say the least, no very happy time for the curioso to roam an enemy country for botanical specimens, especially as he had all the potatoes he needed in the settled hill country around Lima. But assuming that someone did deliberately export potato tubers from the Chiloe region at some date during the critical period we are discussing, how would the journey to Spain have been made?

The tuber would have been harvested in Chiloe in April and forwarded by boat to Lima—when such happened to be available. The sea voyage would take about two weeks. At Lima it would be a thousand chances to one that it got no further, for, from the time of VALDIVIA'S invasion in 1541 till well into the eighteenth century, Chile was regarded as a mere appanage of Peru and had no direct relation, officially or commercially, with the outer world; its exports were consigned to the merchants of Lima, where, presumably, they were merged with the produce of Peru. Assuming, however, that some tubers did get forwarded after change of ship and only a couple of weeks delay, they would have reached Panama two weeks later and then would have been carried by porters and mules a three days' journey across the Isthmus to Nombre de Dios. The arrival in Nombre de Dios might possibly have taken place as early as the end of June if all the connexions had been promptly made. Were a ship ready to start at once, the tuber might be landed at Seville before the end of September; too late, however, to be planted in the same year.

Assuming that the precious tuber had been kept as cool as possible during its journey through the tropics, and its long sea voyage through the warm waters of the gulf and had on arrival in Spain, been placed in a cool cellar till planting time in April, it would still have been out of the ground for about twelve months, a very long time for a tuber, even under the most favourable conditions.

It is not to be denied, however, that such a tuber might still give rise to a plant capable of yielding some sort of a crop, or a crop might have been raised from the secondary tubers which would have formed on the stolons arising from the outgrown sprouts; in either case the problem would have been solved. But the chances of the tuber ever surviving such a journey or, indeed, arriving at all in Spain under the prevailing conditions, are so slender as to be scarcely worth considering.

What then are the alternatives to a Chilean origin with its well-nigh insuperable transport difficulties?

Potatoes were an everyday article of commerce and consumption in

Lima and the northern ports of Peru such as Payta, Tumbes and Buenaventura and, owing to the variety of climatic conditions at any one latitude, they could be grown at practically any time of the year. The journey from Lima to Nombre de Dios could be made in about seventeen days and so arranged that the tubers might be taken on board at once ; in this way they could have arrived in Spain in time to be planted in the early summer.

Another, and more likely, route is for potatoes to have reached Cartagena in Colombia on the north-west Atlantic coast from the Bogotá district. Already by 1549 a regular route had been opened between this port and the interior and the journey from Bogotá was accomplished in about twelve days. Every ship which sailed from Nombre de Dios en route for Spain called at Cartagena and stayed there ten days to receive the royal revenues and await the Margarita patache. It is possible that potatoes might have been taken on board at Cartagena as ship's stores for the journey home, although this was normally done at the next port, Havana.

A further possibility is that somebody may have planted potatoes in his garden at Panama or Nombre de Dios and sent tubers thence to Spain. It is true the Isthmus is not a favourable place for growing potatoes, but they are to-day actually grown there for private use, and it may be recalled that GOODRICH'S 'Purple Chile' was bought in the market at Panama in 1849.

The difficulties both of transit and season would, of course, have been surmounted at one stroke by anyone who had the genius to send home the true seed from the potato-berry instead of tubers. Such seed might have come from a stray fruit in Chile, Peru, Bolivia, or Colombia, and we have no proof that it was not so transmitted. There is, however, very good reason to doubt it.

From time immemorial the native had grown his crop from the tuber. There is no evidence that he consciously raised new seedlings ; what he most probably did was to select plants from amongst the spontaneous self-sown seedling plants he found in his crop. Enquiry both in Chile and Peru has failed to elicit any evidence that the Indian of to-day consciously "breeds" new varieties, though he furnishes himself with many new sorts by the preservation of self-sown seedlings. To the Indian, as to the Spaniard, the seed of the potato was the tuber.

Perhaps the most convincing evidence that true seed was not used for the propagation of the plant is to be found in the fact that the potato of South America, whether we call it *Solanum andigenum* or *S. tuberosum*, never spread into Central or Northern America. The rain forests of north-west Colombia and those of the Isthmus acted as an impassable barrier to a gradual spread of the plant by tuber propagation. Had the Indian been accustomed to handle the potato as true flower seed, this barrier might conceivably have been circumvented. It must, however, be realized that even to-day access to the Isthmus by this route has never been achieved.

Had the potato come over as true flower seed, it is almost certain

that for some time at least this method of propagation would have passed as the normal one for the growing crop. So efficient a botanist and accurate an historian as CLUSIUS would certainly have known of it and told us. CLUSIUS did, in fact, send true seed of the berry from his own plant to his friend, JOANNES HOGELANDIUS, and tells how the seedling plants had different coloured flowers from those of the original parent potato, and that they failed to produce tubers. CLUSIUS remarks that the seedlings were probably not sufficiently matured ; to-day we would suspect that they were exhibiting the short-day habit of their Peru-Bolivian ancestry and were segregating for a number of hybrid characters, including those of short/long day habit and anthocyanin determiners.

It is true that the difference between the potato of GERARD and that of CLUSIUS was only one of tuber skin colour, and that the former might easily have been derived as a seedling of the latter. But had such been the case we may be sure that CLUSIUS would have mentioned it even if GERARD failed to. We may therefore dismiss, as unproved and without foundation, the thesis that the potato was introduced into Europe as true seed.

Realizing that, great as the transit difficulties would have been in the passage of even a single potato tuber from the island of Chiloe to Spain in the period under discussion, they were not insuperable, we are called upon to examine the Russian argument from its botanical aspect, more especially as it is on the assumption of a radical difference between the potato of Peru-Bolivia, *S. andigenum*, and that of Chiloe and South Chile, *S. tuberosum*, that their whole contention is founded.

The differences alleged to exist between the two groups of potatoes originating in Peru-Bolivia and Chile-Chiloe respectively only attain a distinctive value when they are cumulative, such as may be observed when extreme examples from either group are compared. Otherwise it is merely a question of quantitative differences, very difficult to define exactly, and affecting several characters. After a careful study of all the alleged differentia, the writer is convinced that no radical specific difference exists between the members of the two groups such as would allow of a positive statement on the inviolable relation of the European potato to one group rather than to the other.

Throughout the last three hundred years we have been breeding potato varieties in western Europe. At first new varieties were raised in a very haphazard manner but, as the potato gradually won its place as a foodstuff of importance, breeders consciously selected their material in a definite direction with a view—

- (a) to produce an oval or kidney-shaped tuber without ugly out-growths or deep eyes ;
- (b) to eliminate the deep purples and confine the new varieties to those with white or pale red-coloured tubers ;
- (c) to breed for large cropping, *i.e.* plants capable of making the greatest possible use of the long-day environment of western Europe.

All these objects have been attained, but at the cost of losing, *i.e.* dropping out *en route*, some of the characters which are more commonly found in the native Peru-Bolivian varieties of *S. andigenum*.

If, as seems probable, there is some degree of linkage in inheritance between the long-day habit and a broader leaflet with well-developed folioles, then it is not surprising if unconsciously the potato-raiser, in selecting from the germinal potentialities of the Peruvian potato those best suited to the climate of Western Europe, produced a plant resembling that which best suits the closely similar climate of Chiloe.

Experience has shown that it is possible, in two consecutive years' selections from inbred seedling families of Peru-Bolivia *S. andigenum* parentage, to raise plants which do not differ materially from the average type of the Chiloean *S. tuberosum* varieties.

There is, however, a physiological distinction between the norms of the two groups, which the Russians have rightly stressed. Most of the varieties from the high altiplano of central Peru are short-day varieties, whilst those from the Chiloean district are long-day ones, *i.e.* the one produces its tubers only when there are twelve hours or less of daylight, the other when there are about sixteen hours during the growing season. This difference, however, is not an absolute one, and the reaction to length of day within the Peru-Bolivian group is sufficiently wide to allow of the selection of either type.

In 1922 the writer * published a paper on the inheritance of cropping, which dealt with the cross between a wild Mexican species which, under the environmental conditions at Barley, produces no tubers, and a normal heavy-yielding English variety. The mode of crop inheritance was then studied. These experiments showed that cropping capacity is controlled by at least two and probably more factors and that inhibition of cropping is definitely dominant. In subsequent generations there was no difficulty in selecting seedlings which developed excellent crops.

Thanks to the Russian work and to further research we have good reason to believe that the genes which were regarded as factors for cropping may more reasonably be considered as factors controlling the physiological reaction of the plant in respect to the storage of starch in its tubers under varying lengths of daylight. After such transvaluation, the author's work provides abundant evidence as to the segregation of long versus short day habit and the dominance of that of the short day. Very recently EMME and VESELOVSKA † have shown that dominance of the short over the long day habit is incomplete, and that the exceptionally prolonged period of tuber formation in *S. andigenum* is dominant. These facts make it abundantly clear that there is no difficulty in the assumption that the long-day potato of Europe was derived originally from a short-day stock.

If now we examine the early accounts of the potato when it arrived in Europe, we find that it set seed freely, a character which is universal

* SALAMAN, R. N., *Journ. of Genet.*, vol. xx, pp. 311-343 (1929).

† EMME, E. K., and VESELOVSKA, M. N., *Bull. Appl. Bot. Leningrad, Ser. A.*, 14, pp. 5-14 (1935).

in the *S. andigenum* group, and much less common in the Chilean *S. tuberosum*, and that, at an early date, seedlings were raised and new varieties formed. The illustrations which the early writers give us, including the invaluable aquarelle left by CLUSIUS of his original potato, now in the Plantin Museum, all depict very irregular, knobbly, deep-eyed tubers, on plants in which the leaflets are generally narrow and the folioles always poorly developed. Particularly is this the case in the engraved plates in CLUSIUS's own book. The tuber characters of these early potatoes are certainly in keeping with the representations on the ancient Peruvian pots; even the excessive number of tubers to the root, a common fault with the *S. andigenum* as compared with the Chilean varieties, was commented on by ZWINGER* in 1696 as being characteristic of the European potato of his day. The foliage characters also are precisely those attributed by the Russians to the Peru-Bolivian group, which have also been observed at Cambridge.

Of late, a less dogmatic attitude on the part of the Russian savants has been evident. Thus, VESSELOVSKII† says: "The potatoes of the Andes constitute a very large species possessed of an extremely large number of characters, viz. *S. andigenum*, of which the European potato *S. tuberosum* represents one sub-species characterized by a much more limited range of characters."

Here we see that the Chile potato is considered to be but a sub-species of the larger *S. andigenum* group: with this view there seems no reason to quarrel, for the divergent conditions of South Chile would have brought about a change of type by natural selection.

Very recently Dr. BUKASOV has sent the writer a detailed differential diagnosis between the two types, which is here reproduced. To this he adds the following observation: "*S. tuberosum* is apparently closely connected in its origin with a number of wild forms of Southern Chile nearly related to *S. Maglia* Schlecht, like *S. Fonckii* Phil., *S. Molinae* Juz., *S. leptostigma* Juz., all of which have chromosome $2n = 48$, except *S. Maglia*, which is $2n = 36$. On the other hand, in the Andes of Peru and Bolivia undoubtedly there are found growing wild some forms with 48 chromosomes, nearly related to *S. andigenum*, but not all identical with it, one of which is the lately discovered *S. Herrerae* Juz."

DIFFERENCES BETWEEN *S. tuberosum* AND *S. andigenum*.

S. tuberosum differs from *S. andigenum* by a great number of small characters, the chief being included in the following table:

<i>S. tuberosum</i> L.	<i>S. andigenum</i> Juz. et Buk.
<i>Stem</i> with rather shortened internodes, chiefly in its lower part.	<i>Stem</i> with lengthened internodes.
<i>Leaves</i> densely disposed almost at a right-angle to the stem.	<i>Leaves</i> widely spaced, proceeding from the stem at an acute angle.
<i>Rachis</i> generally arched.	<i>Rachis</i> generally upright.

* ZWINGER. Neu Vollkomener Kräuter Buch. Basle (1696).

† VESSELOVSKII, J. V., Inst. Pl. Ind., Leningrad. Problems of Modern Agriculture, 4, pp. 73-80 (1934).

S. tuberosum L.

Leaf segments usually broad.
Pedicels generally passing gradually into the calyx base.
Calyx base rounded.
Flower and calyx with longer and bristly hairs.
Calices large with well-developed sharp ends to their sepals, almost of uniform size and symmetrically disposed.
Anthers often not fully developed, and if well developed, long. Filaments of anthers very thick (generally about 1.5 mm.).
Stigmas very large.
Tubers form best in long-day environment.

S. andigenum Juz. et Buk.

Leaf segments generally narrow.
Pedicels generally abruptly narrowed at the base of the calyx.
Calyx base slightly angular.
Flower and calyx with shorter and less bristly hairs.
Calices often not so large, with shorter sharp ends to their sepals, sometimes not of uniform size and usually not symmetrically disposed.
Anthers well-developed, generally shorter.
Stigmas smaller.
Tubers form best in short-day environment.

In the list of contrasted characters there is not a single one attributed to *S. andigenum* which could not be illustrated by one or more examples from the commercial English varieties of the common potato, *S. tuberosum*. The writer finds it very difficult to believe that *S. Maglia* has entered in any way into the origin of our European potato. It is not only sterile but has certain characteristic features which do not reappear in the common potato, notably the deeply bifid stigma, and extreme susceptibility to common blight.

That there were two introductions into Europe at very considerable intervals of time during the latter half of the sixteenth century has been noted. If the Russian contention is correct, both must have come from the South Chilean region. Seeing that there were well-nigh insuperable transport and other difficulties to be overcome in such an introduction during this period, is it not asking too much of us to believe that the "impossible" occurred twice?

SUMMARY.

The documented history of the cultivated potato in the land of its origin has been carried back to a point which, on the basis of archaeological data, may be placed at about A.D. 200. Anterior to that, Americanists are prepared to allow a further four hundred years during which the immigrant peoples were developing their local culture on the coast. Before this could have been attained, a considerable period, many centuries at least, must have elapsed between the time when the potato was first discovered and cultivated in the sierra and that when it was traded down to the coast. The first cultivation of the potato must therefore have taken place considerably more than 3,000 years ago.

The first European to describe the potato has been shown to be COSTELLANOS, in the year 1537, and not CIEZA.

The first documented mention of the plant in Europe has been ante-dated by at least fifteen years. We are now on safe ground when we state that it was growing in the neighbourhood of Seville in 1572, if not earlier.

There were at least two independent introductions into Europe of varieties closely akin. One such came *via* Spain, the other *via* England. For the latter the claims which have been made that DRAKE was its introducer and RALEIGH its first cultivator, though not proven, cannot be lightly dismissed.

We have good reason to believe that both introductions came from Peru or from modern Ecuador or Colombia, rather than from Chile or the Island of Chiloe.

The spread of the new vegetable throughout Europe, and its varied, but by no means invariably beneficent, effect on the social welfare of the people is another tale, and one of great importance, but its telling must await another opportunity.

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We have to acknowledge with thanks the source of the illustrations to these lectures as follows :—Fig. 3, from *The Potato of Romance and Reality* (Safford), by permission of the Director, Field Museum, Chicago ; fig. 4, Director, Volkerkunde Mus., Berlin ; figs. 5, 8, Director, Univ. Mus., Philadelphia ; figs. 6, 36, Director, Mus. Anthropology, California ; fig. 7, Director, Musée d'Ethnographie, Paris ; figs. 9, 10, Director, Ethnographical Mus., Oslo ; fig. 11, Director, Mus. f. Völkerkunde, Hamburg ; fig. 32, from *Revista del Museo Nacional*, Lima, 1934 ; fig. 33, Director, Mus. de Arqueologica Peruano ; fig. 34, Director, Göteborg Mus. ; fig. 35, The Trustees, Brit. Mus. ; figs. 39, 41, Director, Museo de Arqueologica, Lima ; fig. 40, Director, Linden Mus., Stuttgart ; fig. 42, Director, Mus. Amer. Ind., Haye Found., N.Y. ; fig. 44, *Jour. Heredity* (O. F. Cook), 1925 ; fig. 45, *Comparative Ethnographic Studies* (Norden-skiöld) (1931) ; fig. 46, *Ann. Rep. Smithsonian Inst.* (O. F. Cook), 1918.

PLANTS TO WHICH AWARDS HAVE BEEN MADE IN 1937.

Androsace Halleri. A.M. April 20, 1937. From Dr. Giuseppi, Felixstowe. Sometimes regarded as a variety of *A. carnea*, this attractive tufted species from the Cevennes Mountains has powdered slender stems 3 inches high surmounted by from 2 to 5 small, clear pink flowers with pale yellow eyes. Especially suitable for a pan in the alpine house.

Anomalesia Cunonia. A.M. April 20, 1937. From T. T. Barnard, Esq., Wareham. This is the *Antholyza Cunonia* of t. 343 of the Botanical Magazine. It is an Iridaceous plant from the Cape Peninsula and produces several narrow ridged leaves and a slender scape 18 inches high carrying a terminal spike of six or eight scarlet flowers. The perianth is of curious form, only the three upper segments being fully developed; of these the posterior is strongly hooded and deflexed, the lateral extended like small wings.

Cassiope lycopodioides. A.M. April 20, 1937. From Dr. Giuseppi, Felixstowe. Distributed from Siberia through northern Japan to north-western America, this evergreen mat-forming plant has rounded shoots with closely appressed leaves. The wide open, bell-shaped white flowers hang downwards on very slender red stalks an inch long, while the spreading petals are rolled back along their edges and pointed at their tips. Perfectly hardy, but requiring a cool and well-drained site.

Cassiope Stelleriana. A.M. April 20, 1937. From A. N. Griffith, Esq., Newnham, Cambridge. Distinct from all others in the genus by the spreading and not appressed leaves, resembling those of an *Erica*. In habit creeping, but with erect shoots up to 3 inches high, at the tips of which the small campanulate, pink-tinted white flowers appear on very short stalks, set off by a distinct red calyx. Native to the coastal regions of Alaska and rare in cultivation although long known to botanists.

Cymbidium × '**Adastra.**' A.M. April 20, 1937. A pleasing hybrid obtained by crossing *C.* × '*Letty*' with *C.* × '*Pauwelsii*'. The arching spike bore 12 flowers, of mainly fawn-pink colour, the labellum lighter and reddish on the front lobe. Exhibited by Lionel de Rothschild, Esq., Exbury, Southampton.

Cymbidium × '**Dorchester**' var. '**Saleden.**' A.M. April 20, 1937. This attractive variety was represented by an unusually well-cultivated plant bearing a tall erect spike of 16 large flowers, which are white with rose-crimson on the column and apical portion of the labellum. The result of crossing *C.* × '*Alexanderi*' with *C.* × '*Tityus*'. Exhibited by Miss Walkden, The Raft, Sale, Cheshire.

Cymbidium × '**Hawfinch**' var. '**Wheatley.**' A.M. April 6, 1937. This pleasing hybrid bore an erect spike of 9 large flowers, of greenish-cream colour, the labellum tinged with rose on the central area and

having a row of reddish spots on the margin of the front lobe. The result of crossing *C. × 'Bastard'* with *C. × Alexanderi*. Exhibited by Sir William Cooke, Bart., Wyld Court, Hampstead Norris, Berks.

***Epimedium grandiflorum* var. 'Rose Queen.'** A.M. April 20, 1937. From Miss D. C. Hopton, Hereford. A Japanese plant for woodland or cool and shady places in the garden. The young leaves unfold as the rose-pink flowers are appearing in graceful sprays on slender stems, the whole plant about 15 to 18 inches high.

***Erica Pageana*.** A.M. April 20, 1937. From Mrs. G. Anley, Woking, and Mrs. Dyson Perrins, Malvern. A very beautiful Cape Heath forming a dwarf, bushy shrub suitable for the small greenhouse. The wiry branched growths are densely clothed with small rich green leaves. The large bell-shaped butter-yellow flowers are freely borne in clusters of three or four. This species is figured in the Botanical Magazine, t. 9133.

***Erigeron aureus*.** A.M. May 5, 1936. From Mrs. G. Anley, Woking. A very brightly coloured species from the Rocky Mountains, for the alpine house. Of compact and gradually branching habit, the richly golden blooms are carried on 3 to 4 inch stems, each one an inch or more in diameter.

***Ixia paniculata*.** A.M. April 20, 1937. From Lord Aberconway, Bodnant. A cool house plant with linear, pale green leaves and slender scapes about 2 feet high bearing clustered flowers at their extremities. The perianth-tube is 3 inches long and very narrow, the six lobes elliptical, widely spreading, pale creamy yellow tinged externally with rose.

***Jeffersonia dubia*.** A.M. April 20, 1937. From G. P. Baker, Esq., Sevenoaks. As a native of Manchuria this plant should be perfectly hardy in the open, giving it a northerly aspect, but it is equally useful in the alpine house, forming a tuft about 6 inches in height. The flowers appear with, and are partly hidden by, the unfolding reniform leaves, which have a reddish margin; they are clear lavender-blue, having usually six petals which open to a flat bloom an inch wide.

***Narcissus 'Candour'*.** A.M. for exhibition. April 15, 1937. From the raiser, Mr. Guy L. Wilson, Broughshane, Co. Antrim. A shapely giant Leedsii variety (Division 4a) with flowers $4\frac{1}{2}$ inches in diameter, on stout 16-inch stems. The broad, smooth, overlapping sulphur-white perianth segments $1\frac{3}{4}$ inch long; corona of a deeper shade, recurved at the mouth and indented at the margin $1\frac{1}{2}$ inch long.

***Narcissus 'Daytona'*.** A.M. for exhibition. April 15, 1937. A well-formed bicolor Barrii variety (Division 3b) with flowers just over $3\frac{1}{2}$ inches in diameter, borne on 16-inch stems. The broad, overlapping, perianth segments are white, suffused with pale yellow at their bases. The crinkled, saturnine-red corona is about $1\frac{1}{8}$ inch across the mouth and $\frac{3}{8}$ the length of the perianth segments. Raised and shown by Mr. J. L. Richardson.

***Narcissus 'Diplomat'*.** A.M. for exhibition. April 6, 1937. A neat giant Leedsii (Division 4a) with flowers $3\frac{1}{2}$ inches wide, well

poised on stout 18-inch stems. The greenish-white perianth segments smooth, broad and overlapping; the corona pale gamboge yellow, faintly tinged in the upper part with saffron yellow, just over two-thirds as long as the segments and about as broad as long at the mouth. Raised by Mr. A. M. Wilson and shown by Mr. J. L. Richardson, Prospect House, Waterford.

Narcissus 'Pollindra.' A.M. for exhibition. April 15, 1937. An attractive bicolor *incomparabilis* variety (Division 2b) with flowers nearly $4\frac{1}{2}$ inches in diameter, borne on 20-inch stems. The broad, rounded, smooth, overlapping, creamy-white perianth segments are $1\frac{1}{2}$ inch long. The funnel-shaped primrose-yellow corona, which was pleated at the margin, is $1\frac{3}{8}$ inch long and $1\frac{1}{2}$ inch across the mouth. Raised by Mr. P. D. Williams and shown by Mr. J. L. Richardson.

Odontoglossum crispum var. 'Supreme.' A.M. April 20, 1937. A home-raised plant of outstanding character. The tall spike bore 13 large flowers, with broad sepals and unusually well-developed petals, the margins of which are much crisped and strongly tinged with rose. Exhibited by Messrs. Charlesworth, Haywards Heath.

Primula × 'Ethel Barker.' A.M. April 6, 1937. From F. Barker, Esq., Onosma, Fairview Road, Stevenage. A novel hybrid between *P. Allionii* and *P. hirsuta*, of compact habit and freely flowering. The long-stalked leaves are spoon-shaped, finely downy on both surfaces; the flowers, borne two to five on an extremely short peduncle, have slender pedicels up to $\frac{3}{4}$ inch in length and are bright carmine-pink with a distinct white eye, about $1\frac{1}{4}$ inch across.

Primula × Forsteri. A.M. April 6, 1937. From G. H. Berry, Esq., The Highlands, Ridgeway, Enfield. A natural hybrid of *P. minima* and *P. hirsuta* with the toothed leaves of the former, but much larger; the flowers, on short pedicels, are rather more than an inch wide and have lilac-pink bifid petals. A very finely grown plant was shown.

Prunus Persica 'Cambridge Carmine.' A.M. April 20, 1937. From F. G. Preston, Esq., Cambridge. A free-flowering, semi-double Peach with flowers of good size, bright rosy carmine with paler centres.

Ranzania japonica. A.M. April 20, 1937. From Miss D. C. Hopton, Hereford. This member of a monotypic genus allied to *Podophyllum* is found in Japan, and although distinguished in 1888 seems only lately to have come into cultivation in Britain. The very pale lilac flowers are produced from between two unopened leaves and are of six segments, spreading and pendulous. Probably hardy in a suitable position, but as yet only tried under shelter. The rather curious generic name commemorates an eminent Japanese botanist.

Rhododendron × 'Bluebird.' P.C. April 20, 1937. Shown by Lord Aberconway, Bodnant, N. Wales, as a hardy flowering plant for the rock garden. A cross between *R. Augustinii* and *R. intricatum*. The small compact truss of 7 flowers is about 3 inches across, and the widely spreading, almost flat, violet-mauve flowers are about 2 inches

across, with wavy margins to the corolla lobes and long exserted style and stamens, the filaments mauve and the style reddish. The glabrous, ovate leaves are up to $1\frac{1}{2}$ inch long.

Rhododendron 'Cardinal.' F.C.C. April 6, 1937. From Lord Aberconway, Bodnant, N. Wales. A hybrid raised from *R. arboreum* \times *R. Barclayi*, and shown as a hardy flowering shrub, bearing spherical trusses of fifteen or sixteen scarlet, widely funnel-shaped flowers, up to $3\frac{1}{2}$ inches across by 2 inches deep. The leaves, dull green above and pale, bright green below, are up to 5 inches long by $2\frac{1}{2}$ inches wide. The red pedicels, as well as the leaves, are glabrous.

Rhododendron commodum. A.M. April 6, 1937. From the Earl of Stair, Stranraer, Wigtownshire. Shown as a tender flowering plant for sheltered positions. The small sulphur-yellow flowers, up to $1\frac{1}{2}$ inch across by $\frac{3}{4}$ inch deep, with five deep, spreading lobes, are arranged in trusses of five or six at the tips of the branches. The ovate to oblanceolate, obtuse, mucronate leaves, about $2\frac{1}{2}$ inches long by $1\frac{1}{2}$ inch wide, dark green above and paler below, are minutely glandular-dotted on both surfaces.

Rhododendron Elliottii. F.C.C. April 20, 1937. A tender flowering shrub from Admiral Walker-Heneage-Vivian, Blackpill, Swansea, with fine trusses of about twenty deep scarlet flowers spotted light chocolate within, the corolla funnel-shaped, up to $2\frac{1}{2}$ inches wide by $2\frac{3}{4}$ inches deep; the oblong leaves up to 11 inches long by $4\frac{1}{2}$ inches wide, mat green above, bright shiny green below.

Rhododendron oreodoxa. A.M. April 6, 1937. Shown by Lionel de Rothschild, Esq., Exbury House, Southampton, as a hardy flowering shrub. Loose trusses up to $4\frac{1}{2}$ inches across of about six pale rose flowers with a darker stripe down the centre of each lobe; the corolla funnel-shaped, up to $2\frac{1}{2}$ inches across by 2 inches deep, the lobes small. The oblong to ovate leaves are rounded at both ends, about $3\frac{1}{2}$ inches long by $1\frac{1}{2}$ inch wide, glabrous, dark green above and paler below.

Rhododendron 'Redwing.' F.C.C. April 6, 1937. Shown by Lord Aberconway as a hardy flowering plant, and raised from *R. Barclayi* \times *R. Shilsonii*. Compact globular trusses, up to 6 inches across by 4 inches deep, with ten or eleven deep carmine-scarlet flowers in each; the flowers funnel-shaped, up to $3\frac{1}{2}$ inches wide by $1\frac{1}{2}$ inch deep; the glabrous leaves, dull green above, are paler beneath, up to $4\frac{1}{2}$ inches long by 2 inches wide.

Rhododendron stenaulon. A.M. April 6, 1937. Shown by the Earl of Stair and Lionel de Rothschild, Esq., as a flowering shrub for the cool greenhouse. Flowers silvery-lilac, with a faint violet tinge within, darker towards the margins of the lobes, the tube spotted pale brown at the back, the narrow tube pale crimson on the outside, borne on long slender pedicels in loose trusses of about ten. The glabrous, shiny, narrowly lanceolate leaves are about 6 inches long by $1\frac{1}{2}$ inch wide, and the young leaves, arising from the centres of the trusses, are held in umbrella-like rosettes above the older trusses.

Rhododendron × 'White Glory.' A.M. April 20, 1937. A hybrid between *R. irroratum* × *R. Loderi*, shown by Lady Loder, Leonardslee, Horsham, as a hardy flowering shrub for general garden use. The rather loose, globular trusses of fifteen to eighteen flowers are up to 7½ inches wide by 7 inches deep: flowers large, widely funnel shaped, pure white except for pale crimson spotting within at the back of the corolla tube near the base. The narrowly ovate, glabrous leaves are up to 4½ inches long by 1½ inch wide, dark green above, paler below.

Sanguinaria canadensis flore pleno. A.M. April 20, 1937. From Dr. Giuseppi, Felixstowe. An exquisite double form of the Canadian Blood-Root, the pure white blooms, like miniature water-lilies, held up above the uncurling glaucous leaves.

Viola Grisebachiana. A.M. April 20, 1937. From Dr. N. W. Jenkin, Hindhead. This particularly lovely alpine Violet is said to be native to Jugo-Slavia, but in this instance was collected on the Grecian Pindus Mountains. The leaves are small, spoon-shaped with upturned edges; the flowers, held up by stout stems 2 inches long, are more than three-quarters of an inch wide, of the purest lavender hue, but with a tiny yellow and white eye.

Viola Herzogii. A.M. April 20, 1937. From Mrs. H. P. Thompson, Weybridge. A plant growing on marble rocks in southern Jugo-Slavia, raised from seed collected by the exhibitor. The leaves are linear, over an inch in length; the flowers, on 2 or 3 inch stems, are nearly an inch wide, having four rounded cream upper petals, and the fifth and lowest broadly spade-shaped, yellow with a few small brownish streaks at the eye.

BOOK REVIEWS.

"The Stapeliae." By A. White and B. L. Sloane. Ed. 2. 3 vols. La. 8vo. xvi + (1-408) + (409-818) + (819-1185) + 1-23 pp. (White & Sloane, Dominion Avenue, Pasadena, 1937.) \$12.50.

Since we had the pleasure of commending the first edition of "The Stapeliae" to our Fellows a very few years ago, the book has grown from its original 206 pages to nearly 1200, and all we said of that first edition applies equally to this new one. The curious plants—curious both in habit and flower—with which the book deals have a peculiar fascination, as strong, indeed, as the odour which some of them produce and which is so attractive to blue-bottles.

To all who have felt this fascination and to all who are seeking an interesting group of plants to grow in their greenhouses we commend this book for the infective enthusiasm with which it has evidently been written, its excellent illustrations, the careful editing of the text, the painstaking care with which the material it includes has been sought and brought together from many and varied sources, then sifted and arranged, and indeed for everything except the shiny paper upon which it is printed.

"My Garden by the Sea." By R. A. Foster-Melliar. 8vo. xi + 212 pp. (Bell, London, 1936.) 6s.

The garden is on the north coast of Cornwall, wind swept and fairly mild. The book tells of the garden's making, and of the way its originally open site has been turned into a place for beautiful plants. The story is told with humour and knowledge and will doubtless help others in similar situations to avoid some of the pitfalls that await the maker of a new garden.

"The Garden Year." By H. Cowley. 8vo. 288 pp. (English Universities' Press, London, 1936.) 5s.

This is a book of reminders for garden work the year round, beginning in March. The outdoor garden for fruit, flowers, and vegetables, and gardening under glass are all catered for.

It is, of course, a diary written in the form of a book, and methods of cultivation are not fully treated. There are many hints, however, and they increase the value of the book beyond that of a mere diary.

We are sorry to see *Cupressus macrocarpa* recommended as a hedge, even with the reservation, "not for windy places." There are so many really good hedge plants that we can well do without this, which has an unhappy knack of dying in patches without any apparent reason.

"Soil Conditions and Plant Growth." By Sir E. John Russell. Ed. 7. 8vo. viii + 655 pp. (Longmans, Green, London, 1937.) 21s.

First published in 1912, this book at once took its place as the foremost exposition of the broad principles upon which soil science is based, and new editions followed in 1915, 1917, 1921, 1927, 1932, and now in 1937.

The last edition, while it has not added to the size of the book, contains much new matter, and many of the pages have been entirely re-written. So it maintains the place to which it leaped on its first issue—a live account of all that pertains to the soil and the relationship between plant and soil—an indispensable book.

"The Feeding of Crops and Stock." Part I, The Plant; Part II, Fertilizers and Manures. By Sir A. D. Hall. Ed. 2. 8vo. ix + 120 pp.; ix + 122 pp. (Murray, 1937.) 3s. 6d. each part.

These form two parts (of three) of a new edition of the author's *Feeding of Crops and Stock*, first published in 1911. Much has been re-written, and as they stand the books can be read with profit by young gardeners who have had no special training in science. They form an elementary introduction to a knowledge of the way plants obtain and utilize their food.

The author's clear style and wide knowledge, together with his great experience of the requirements of young gardeners, have enabled him to produce two books that should put them on the right road towards a knowledge of the essential principles of their craft.

"A Woodland Garden." By A. T. Johnson. 8vo. (Country Life, 1937.) 12s. 6d.

Books on gardening may be divided into two main classes—those which one uses as books of reference and those which one reads for pleasure. A few—a very few—belong to both classes. Of recent years very many books have appeared in which the writers describe their own gardens or chat about their gardens. The majority of these are pleasant enough to read, but do not add much to the knowledge of experienced gardeners. Occasionally, however, a book is produced which is not only very pleasant to read, but is so full of valuable suggestions and information that it deserves a place amongst the permanent occupants of a gardener's library. Such a book is "A Woodland Garden," by A. T. Johnson. The writer is a real gardener, for he not only loves plants but studies them and knows them intimately. He has, too, the taste and discrimination in choosing and placing plants, which is more rare and more valuable than skill in cultivation. In addition, he has the gift of getting across to readers his own enthusiasms, and his writings, therefore, at the same time please, inspire and teach.

Mr. Johnson's garden is essentially an owner's garden. It is large enough to contain a really good collection of choice plants, but small enough to be planned and planted entirely by himself and his wife. His garden, and his writings about his garden, are therefore expressions of his own individuality and of his own intimate experience and knowledge. His garden is varied in character, and he has as much skill in making the best of hot sunny banks as in choosing rightly and growing successfully plants which love shade. It is of these latter plants of which he mainly writes in "A Woodland Garden." This is a fascinating book, which is not only very pleasant to read but is full of inspiration and information for those who would plan and plant a shady glade, and very few gardeners fail to see the special charm of this form of gardening. Woodland plants do not usually make the great splashes of colour provided by borders in the sun, but they have a delicate appeal all their own, and some colours have an enhanced value when seen in diffused light. Blue is always very blue in the shade, and white has a pearly quality which is lost in a glare. The only colours which are difficult to place rightly in a wood are the hot reds and scarlets, but luckily plants with flowers of these colours mostly like sun. Successful woodland gardening needs good taste as well as good knowledge. It needs a right appreciation of what plants "belong" to informal glades, and it needs an intimate knowledge of the characters and needs of shade-loving plants. Most woodland plants repay the closest examination, and no better guide in acquiring the gardener's eye can be found than Mr. Johnson, for he has a keen sense of subtle variations in colour and shape of flowers and foliage. This appears especially in his very full and critical account of *Gaultheria* and *Vaccinium*, unobtrusive but charming plants which exactly suit a woodland garden.

So many plants are described in this book that it is ungenerous to note omissions, but one wonders why no mention is made of *Cassiope*, one of the most charming of all dwarf ericaceous plants. Mr. Johnson succeeds with *Phyllodoce coerulea* and therefore creates envy in most hearts. He is sure to be successful with such gems as *Cassiope lycopodioides* and *C. selaginoides*, and may succeed with *C. stelleriana* or even with *C. hypnoides*. Another omission is *Leucothoe*. *L. Davisiae* and *L. Keiskii* are quite indispensable in a woodland garden of choice plants.

The book is very fully illustrated by photographs taken by the author in his own garden. These are mostly "close ups," and as such give details of foliage, flower and fruit. But close-up photographs are seldom fully explanatory, for they fail to indicate the habit and size of the plants. For example the photographs of *Gaultheria hispida* and *G. trichophylla* show very well the fruits of these two species, but give no indication that the former is an upright shrub and the latter quite prostrate. The ideal representation of a plant is a combination of a photograph showing the plant in relation to its surroundings, with another at close quarters showing details. As close ups Mr. Johnson's photographs are very good—indeed, the whole book is one to buy, to read, and to study.

E. S. LYTTLE.

"Humus: Origin, Chemical Composition, and Importance in Nature."
By S. A. Waksman. 8vo. 412 + 82 pp. (Baillière, Tindall & Cox, London, 1936.) 30s.

Gardeners were slow to utilize chemical manures after their discovery; they preferred rather to trust their leaf-mould composts and organic manures. As will be seen by readers of Waksman's book time has, in part at least, justified them. Liebig and his followers had but a purely chemical conception of the processes of change taking place in the soil. The importance of the soil fauna and flora and their activity in circulating the carbon and nitrogen of organic matter was not realized until bacteriology had become firmly established. By that time the virtues of "N.P. and K." fertilizers had been preached to all. In the first part of the book the author traces the historical development of the changing conceptions concerning the chemical nature of humus itself, and how it came to be realized that all soil micro-organisms are in the final analysis dependent upon the plant or animal residues for their energy and food.

The second part of the volume deals with the origin of humus, chemical compounds isolated from humus, and the chemical nature of humus as a whole. Perhaps the finest feature of the work is the co-ordination and synthesis displayed in the chapters (*e.g.* VII—Chemical nature of humus) in which, writing with greater freedom from citations, the author classifies and arranges the salient features of the carbohydrates concerned, of the soil nitrogen constituents, of the lignin-like compounds and the inter-relationship of these groups as seen in the C/N ratio.

To all horticulturists we can recommend the chapters dealing with the formation of humus in composts, from animal manures, and from green manuring. The value of green manuring was reported in this JOURNAL by Page in 1922 as a result of experiments carried out on the Wisley light soils. Nowadays many workers are making strenuous endeavours to provide growers with sources of organic manures; we have the "Adco" process—not mentioned in the subject index by the way; Sir Albert Howard's Indore process, now undergoing practical test under industrial conditions in this country; we have also to consider the recommendations of Subrahmanyan of Bangalore, who advocates the use of oxidizing agents to accelerate the decomposition of humus, and those of Greening, who reported in this JOURNAL beneficial growth responses shown by grass and other garden plants by the addition of potassium permanganate which he considers accelerates the decomposition of organic matter in soils as it does on the rubbish heap.

The relative rates of formation and decomposition of humus govern the content in the soil of organic matter and play a very important part in plant distribution—*e.g.* high moisture and low temperature cause rapid peat accumulation, and under certain tropical and subtropical climates the exceedingly rapid destruction of humus in soils by biological activity presents a problem of paramount importance to agriculturists and foresters, and is not unknown to social reformers and governments.

Amongst other topics dealt with in this section are humus in peats and coal, humus formation in water, the colloidal considerations of which perhaps the most important to the practical gardener is the well-known "buffering" action of humus in a soil which prevents rapid fluctuations in the intensity of acidity or alkalinity of the soil reaction. This was clearly pointed out by Page, as chemist at Wisley, whose words Waksman quotes. Too often all humus is regarded as of acid reaction, yet certain peats formed in the Fenlands, where rich telluric waters flow slowly, often contains too much carbonate of lime for rhododendrons.

The final section of the book deals with the decomposition of humus in Nature and the part played by it, and with the various applications to which humus has been put. Interesting points to gardeners concern the action of the mushroom mycelium capable of destroying humus for its own rapid growth, the evolution of carbon-dioxide given off by decaying manures and its value as a potential supply of this gas to the growing plant, the influence of lime on the rate of decomposition of humus and the liberation of nitrogen as ammonia.

Attempts have been made from time to time to utilize humus as a fertilizer, or to improve soils by its mechanical action. A very striking demonstration of the effect of humus on the growth of useful forest trees has recently been made in this country by Dr. Rayner. The addition of various organic substances to Dorset soils has resulted in almost phenomenally large increments of growth by conifers compared with those made in untreated soils.

Chemicals have been added to humus materials before sale; other attempts to utilize humus with cultures of bacteria have met with limited success. In this JOURNAL, 1915, are reports of tests with bacterized peat, carried out by Chittenden, who observed increased growth of several species grown in pots

when large and small proportions of the peat were used. Quite possibly the peat acted as a source of some growth-promoting substance for which Bottomley suggested the term auximone. In the open successful results were not realized, and, moreover, a uniform product was not generally available for further critical work. Many other preparations, including brown coal, have been marketed, but in general their success has been a partial one, perhaps limited to their water-holding capacity and mechanical action on the heavier soils.

Definite growth-promoting substances have now been isolated and recognized chemically, and their effects studied; we know that in small quantity certain substituted acetic acids—*e.g.* β indolyl-acetic acid (or heteroauxin)—may influence cell divisions and root formation, as reported by the reviewer in this JOURNAL for 1936. Such compounds bear a very close relation to tryptophane, itself formed from the hydrolysis of plant proteins and amino-acids. The application of these substances to soil is unlikely to prove both economical and beneficial, as they are decomposed by many soil bacteria. We have, however, to consider the possibility that both the humus compounds used by Rayner, and also the bacterized peat tested, contained small quantities of such active compounds. Waksman briefly discusses the claims put forward for such preparations of humic origin.

The merits of leaf-mould have never been more fully considered nor more clearly presented than in this book; no chemical mixture of "artificial manures," however well balanced its ingredients, as yet produced, contains all the "virtues" of humus—as provider of nutrients aided by bacterial action, as mechanical improver of aeration, as chemical "buffer" regulating changes in acidity, as retainer of moisture, and as a possible source of a growth-promoting substance, be it termed auxin, auximone, or hormone.

Finally, the bibliography of over thirteen hundred titles is worthy of special mention. Citation is often by number only in the text, there is also a lengthy author's index, exclusive of the bibliography; the arrangement may sometimes result in a little time being taken in finding any reference in the text if one does not know subject and author, but we owe a debt of gratitude to the author for bringing together such a complete list.

The text is free from errors, the many tables and diagrams are most helpful, and the few photographic illustrations well chosen and reproduced; on p. 17 we find "certain forest shrubs (*Adiantum*)"—"ferns" is more appropriate surely.

This is primarily a work of reference for senior students and research workers, and demands of the reader some chemical knowledge. Just as Professor Waksman's previous book soon came to be recognized as the authority on soil microbiology, so is this volume likely to be numbered amongst our scientific "classics." It forms a most useful acquisition to our horticultural library, for it tells us what humus is, how it is formed, and what it does and how it may be used.

M. A. H. TINCKER.

NOTES AND ABSTRACTS.

Arabis, the genus in the Pacific North-West. By Reed C. Rollins (*Res. Stud.*, State Coll., Washington, iv, 1-52; March 1936).—A critical review of twenty-two species and ten varieties, apparently of little garden value, from the States of Washington, Oregon and Idaho, and a bibliography of twenty-four principal references is appended.—*B. O. M.*

Bats and Flowers [Fledermäuse und Blumen]. By L. van der Pijl (*Flora*, 181, 1-40; illus. 1936).—The adaptation of many flowers to pollination by insects and of certain tropical flowers to pollination by humming-birds is well known, but the relation between bats and flowers has received less attention.

The present paper, while briefly surveying previous literature and giving a useful bibliography (p. 40), is principally concerned with observations made in Java. The author concludes that bat-frequented flowers are characterized by a combination of nocturnal blooming or honey-secretion, an unpleasant, sour or fusty smell, a stout enough construction of flower or inflorescence to carry a bat's weight, abundant slimy honey accessible to a bat's tongue (which can be pushed out to 6 cm.), abundant pollen, light or dull flower-colour and exposed position. These features may be noted in certain greenhouse plants; examples are provided by *Agave*, *Ochroma*, *Aperua*, *Crescentia*, *Parmentiera*, *Adansonia*, *Kigelia*, *Markhamia*, *Durio*, *Gossampinus*, *Sonneratia*, *Parkia*, etc., all more or less tropical genera.—*W. T. S.*

Cestrum, the genus in Guatemala. By C. V. Morton (*Journ. Arnold Arbor.*, xvii, 341-349; Oct. 1936).—In this review nineteen species are described, of which five, and one variety, are newly published; a key is supplied for identification.—*B. O. M.*

Fasciation and Dichotomy. By J. C. Schoute (*Rec. Trav. Bot. Néerl.*, xxxiii, pp. 649-669; 1936).—Section 1 of this paper is a brief introduction to the phenomenon of fasciation in plants of all kinds, in stems as well as roots, characterized by the apex of the stem being cuneiform with a narrow ridge and not paraboloid in shape.

Section 2 is descriptive of the various forms which may occur, favoured by excess nutrition. These are: (a) typical, in which the part is flattened by gradual expansion from a normal base, perhaps later developing folds, crosier-like curves, or splitting. This may occur in either stems or roots; (b) radiate fasciation, like the third type, is found in stems alone, the apex becoming stellate, with several arms and in cross-section consequently radiate. The third type, (c) ring-fasciation, is rare, but may, as in a certain case of *Pisum sativum*, breed true. The stem-apex here forms a ring, the inner surface of which may or may not bear foliar and floral organs. A double vascular ring is characteristic of these malformations, the inner having no connexion with the outer.

The author distinguishes connation, in which stems or roots are fused from their point of origin and may break up at a later stage into normal components again, from true fasciation, although he agrees that there is no anatomical distinction between them. This differentiation was first suggested by A. Nestler in 1894.

Section 3 deals with possible explanations of such abnormalities, first reviewing those of previous authors and dismissing the theory of fusion of stems. The alternate proposal of expansion in one diameter is accepted, and basing his argument on this ground the present author suggests and describes how in vigorous stems fasciation may arise through an unusually large "primary zone" causing tension in a tangential direction. This "primary zone" is defined as the central part of the vegetative cone in which no organs have yet been induced, and is succeeded by two other zones where differentiation takes place. Explanations of typical, radiate, and ring-fasciation follow on this theory, whilst an illustration shows a series of cross-sections through a fasciated stem of *Celosia cristata*.

In Chapter II dichotomy is considered and compared in origin with fasciation, with remarks on equal and unequal dichotomy.—*B. O. M.*

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SEMPERVIVUMS.

By H. F. R. MILLER, F.R.H.S.

[Read April 20, 1937; Mr. W. E. TH. INGWERSEN in the Chair.]

THE genus *Sempervivum*, belonging to the family Crassulaceae, includes several tender species, but the name *Sempervivum* is generally applied only to the hardy section of the genus, and it is in that restricted sense that it will be used in this lecture.

The plants are essentially alpine, and in their natural habitats are generally found at considerable elevations, 4,000–9,000 feet and even higher. Several species have, however, been in cultivation for many years and "escapes" from cultivation may be encountered at quite low altitudes. It is supposed that the existence of *Sempervivum tectorum*, the common houseleek, on the roofs of cottages is due to the superstition that a building on which it grows will never be struck by lightning, but it is also possible that in a few cases it was thus planted on account of its extensive use for medicinal purposes. Although some of the species, e.g. *S. tectorum*, may be found in their natural surroundings growing in short mountain turf, yet in cultivation they only look satisfactory when associated with rock, either on dry walls, rock-gardens, or stone sinks. It may be partly because this treatment has often been disregarded in the past that some growers of rock plants have not taken much interest in the genus. The level pocket in the rock garden, and the moraine, while admirably suited for the display of most rock plants, do not enable us to place the *Sempervivums* to the best advantage.

The smaller species should invariably be planted either in rock crevices or on the tops of large rocks. A rock with a flat top can

often be prepared as a home for *Sempervivums* by cementing some small pieces of the same type of rock in an irregular fashion on the top of the rock so that a shallow pan is formed. If the cement be coloured to match the stone and attention be paid to the stratification of the small pieces of rock, the result should soon lose any appearance of artificiality. If the stone used is yellowish or red in tone, the correct tint can be imparted to the cement by adding a little red or yellow ochre when mixing. Those unaccustomed to this type of work should note that the cement should be mixed with sand of about twice its bulk, and that the large rock and the small stones must be cleansed of earth and thoroughly wetted in order that the cement may hold them together firmly. The larger species of *Sempervivum* should be planted at the foot of rocks, preferably on steeply sloping ground and a foot or two above path level. It must be realized that these suggestions are made in order that the grower may obtain the best artistic result, and not because the plants require this treatment for their health.

The majority of alpine plants are grown for the beauty of their flowers, but this is certainly not true of most *Sempervivums*, though a few species, *e.g.* *S. arachnoideum*, have flowers which will compare favourably, both in shape and coloration, with many other examples of the alpine flora. On the whole, however, we grow the *Sempervivums* for the beauty of their rosettes. The wonderful coloration assumed by the rosettes of some species in early summer is, perhaps, somewhat transient, for it lasts only for a few weeks, but even in mid-winter the rosettes are neat and attractive and, though somewhat sombre in hue, form an excellent contrast to the silver of the encrusted saxifrages, in association with which they should be planted.

It is quite impossible in a short lecture to consider in detail the different species. Some of the plants which have been given specific rank are only minutely differentiated, and the members of our Society will, in the main, be interested in the genus for garden rather than for botanical purposes. Those who would pursue the subject further should read Dr. R. LLOYD PRÆGER's monograph, *An Account of the Sempervivum Group*, published by our Society in 1932. This comprehensive work provides details of most of the species in cultivation, and without the information derived therefrom, I should still have a very hazy knowledge of the genus. Nomenclature presents great difficulties, for the flowers show considerable uniformity, and the shape, coloration and hairiness of the rosette leaves are apt to vary greatly from season to season, and also according to the different kinds of soil and different exposures in which the plants are grown.

The hardy *Sempervivums* at present in cultivation are divided botanically into two sections. The larger section, embracing about twenty named species and many hybrids, is known as the *Eusempervivum* section. The flowers are star-shaped; they have 9 to 20 petals and are red or yellow. The smaller, the *Jovisbarba*, section contains five recognized species, and the flowers are bell-shaped, the 6 or 7 petals

being erect and yellow. No hybrids are known between plants in this section or between the two sections. Owing to the difference in the shape of the flower a plant can always be assigned to one of these two sections when flowers are present, but certain species of both sections seldom flower in cultivation.

The Jovisbarba section contains one species which is quite distinct from all other Sempervivums. This is *S. Heuffelii* Schott (syn. *S. patens* Grisebach and Schenk, *S. Reginae-Amaliae* Baker). The vegetative increase of all other species of Sempervivum of both sections takes place by the growth of small rosettes on the ends of stolons or runners. These stolons may be long or short, but the young rosette is quite separate from the parent plant and sends down its own roots; but *S. Heuffelii* increases by the parent rosette forming into two or more rosettes, or by new rosettes growing directly from the root-stock. Thus the plant grows into a compact tuft, and in its adult stage should seldom be confused with any other. Unfortunately it must be added that some other species occasionally adopt this "freakish" method of increase, presumably to puzzle the horticulturist! This species was originally described as having its leaves lightly hairy on the face and back. Perfectly smooth leaved forms should, therefore, be known as *S. Heuffelii* var. *glabrum*, but the amount of hairiness of the leaves is very variable: a plant with quite strong hairs in a dry season will look almost smooth in a wet season. The shape, size and coloration of the leaves is also very variable. Some forms have greyish-green leaves under all conditions; other forms which are green under normal conditions become deep brown-purple when subjected to drought. *S. Heuffelii* is one of the most attractive species, either for the rock garden or the alpine house: its rosettes are very decorative and it is more prodigal with its flowers than the other species in this section. But in the garden it must be protected from slugs, which are very apt to attack the collar of the plant. It looks its best when planted in a vertical crevice.

S. Allionii Jord. and Fourr. is the most distinct of the remaining four species of the Jovisbarba section. The name has been replaced in the 1934 Kew Hand-list of Rock Garden Plants by *S. hirsutum* Pollini, but for several reasons it seems preferable to retain the name under which it is generally known. The faces and backs of the leaves, viewed through a magnifying glass, are seen to be covered with minute hairs, unlike the other three species in this section which are perfectly smooth. But this species is more easily recognizable by the uniform bright yellow-green of its leaves and by the conical shape of the rosette. A good clump in the rock garden gives a bright patch of colour at all seasons of the year and is generally admired.

The remaining species of this section are *S. arenarium* Koch, *S. hirtum* Linnaeus, and *S. soboliferum* Sims. *S. arenarium* is the smallest and *S. soboliferum* is the most globular in shape (it is often called *S. globiferum*). The stolons of these species are extremely thin and fragile, and the young rosettes of *S. soboliferum* appear on the

top as well as the sides of the parent rosette, whence they fall when they have reached a certain size and soon cover a large area of ground. Owing to this characteristic it is often known as the 'Hen and Chickens' houseleek. *S. hirtum* has a similar habit, though the young rosettes do not grow quite at the top of the parent. Some forms of this become bright red in summer, so that it is very decorative in the garden. Obviously these species cannot be grown in crevices or on very steep slopes or the vagrant young will roll too far from home and take root, possibly in clumps of other species, to the confusion of their owner.

Turning to the *Eusempervivum* section we are faced with a formidable task: not only are there more than twenty recognized species with many forms, but most of these species have given birth to hybrids which in many cases have again hybridized.

The *Eusempervivum* section may be divided into two groups: species having pink or red flowers and species having yellow flowers; but as natural hybridization has occurred between these groups plants may be found having flowers with yellow petals flushed with red. The red-flowered group includes the following species: *S. arachnoideum*, *S. atlanticum*, *S. cantabricum*, *S. caucasicum*, *S. dolomiticum*, *S. erythraeum*, *S. Kosaninii*, *S. macedonicum*, *S. montanum*, *S. pumilum*, *S. Schlehanii* and *S. tectorum*, and many hybrids, of which we may mention: *S. × calcaratum*, *S. × Funckii*, *S. × Gamma*, and *S. × ornatum*.

The Kew Hand-list of Rock Garden Plants (1934) replaces the name *S. Schlehanii* Schott by *S. marmoreum* Grisebach, but it appears that these are probably distinct species, differing from each other and from *S. tectorum* in small botanical details. *S. tectorum* is the most variable species in the genus, both in size and in coloration. Small forms with green, sometimes purple-tipped, rosettes of about 2 inches in diameter are called *S. tectorum* var. *alpinum* and are not particularly interesting. The ordinary houseleek, *S. tectorum*, has rosettes of 4 inches or more in diameter, green with a deep brown tip; a more attractive plant of similar size is *S. tectorum glaucum*, of a blue-green colour, the leaves having a whitish base. *Calcareum* is, however, the best variety of this species for decorative purposes, the green rosettes having a bright red-brown tip, which in the form 'Mrs. Giuseppe' becomes almost vermilion in summer. This is certainly one of the best plants in the genus. The edges of the rosette leaves of all species of *Sempervivum* are more or less hairy, but some species have the faces and backs of the leaves perfectly smooth, and this is the condition in *S. tectorum* and its varieties. This is true also of the adult leaves of *S. Schlehanii* and its varieties, but the leaves of the young rosettes of this species are lightly downy on face and back. The flowers of *S. Schlehanii* are very similar to those of *S. tectorum*, save that the dull pink petals of *S. Schlehanii* have a white edge. In general appearance the ordinary forms of *S. Schlehanii* are very similar to *S. tectorum*, but there is one called *rubrifolium* having bright crimson



FIG. 79.—*SELMIVIVUM ARACHNOIDUM* (ABOVE) AND *S. ERYTHRAEUM*
IN MR. MILLER'S GARDEN



FIG. 80 — *SEMPERVIVUM MACEDONICUM*

leaves, margined and tipped with green. This is a very fine plant, and the bright coloration endures for the greater part of the summer. More fleeting, but still brighter is the May-June coloration of *S. × ornatum*: the crimson is more intense and the margin is light sea-green. The origin of this plant is obscure, though *S. Schlehanii rubrifolium* should certainly be one of its parents. It is certainly the most popular of the large Sempervivums. Probably *S. tectorum* and *S. Schlehanii* are local developments of one prototype species. *S. tectorum* and its varieties are only found in the Western Alps, whereas *S. Schlehanii* is confined to the Balkans. *S. × calcaratum* is somewhat similar to *S. tectorum glaucum*, though larger; a well-grown rosette may be 8-12 inches in diameter. The faces and backs of the leaves are perfectly smooth. Forms vary in colour from blue-green to purple, but the coloration varies with the soil and the position in which the plant is grown. Before now I have asked a friend for a rosette of a particularly bright coloured form, only to find it had come from one of my own plants a year or two earlier!

S. arachnoideum (fig. 79) is certainly the most attractive species of the genus, and one of the most beautiful plants of the alpine flora. FARRER says in the English Rock Garden: "It is a really lovely little jewel, no less in its masses of neat woolly-white balls than when among them rose up stems of three or four inches in summer, expanding sprays of large and comfortable twelve-rayed stars in the most glowing shade of ruby-rose, shining on the hot banks of the Alps like little catherine-wheels of living red light, above the crowded whiteness of the globules below." The species is often called the cobweb house-leek, and indeed the long hairs, which grow from each leaf tip and become interwoven all over the plant, present very much the appearance of a cobweb, though their function is not to catch flies but the mountain dew, and to act as a sunshade from the fierce rays of the summer sun at the high altitudes which the plant inhabits. In the Alps in winter the plant is kept dry under a thick mantle of snow; but in this country the cobweb acts as a sponge to absorb our winter rains, and for self-preservation the plant loses its hairy covering, which would cause it to rot away, and only begins to regain it when it experiences the drying winds of March. If, therefore, we would preserve the cobweb during the winter months, we must provide plants growing in the open with protective cloches, and even then the dampness of the soil will cause a diminution of the cobweb.

Even in summer some forms of this species are much less prodigal with their production of cobweb than is the type, and these are known as *S. arachnoideum glabrescens*. The rosettes of these forms are generally smaller than the type and entirely green in colour; not stained with red as are the typical forms. Several large forms have been collected and these are generally covered in summer with a particularly dense cobweb and are known as *S. arachnoideum tomentosum*. Moreover, they are generally flushed with bright red, and one form found by Dr. STANSFIELD is bright crimson in summer. This, when

well grown, is quite the most desirable plant in the genus ; but, whether grown in pans or in the rock garden, it needs frequent division and fresh soil or else the rosettes become smaller and less brilliant in colour. The clear pink of the flowers of var. *Stansfieldii*, in conjunction with its thick cobweb, seem to show that it is of pure *arachnoideum* blood ; but the species has given birth to many hybrids, some of which, e.g. *S. × Gamma*, are very attractive. These hybrids have not the hairy covering of *S. arachnoideum*, but betray their parentage by having tufts of hair at each leaf-tip. The leaves of *S. × Gamma* become bright red in May.

The remaining red-flowered species which is prevalent in western districts is *S. montanum*, which has lightish green glandular-hairy leaves and flowers with narrow petals of a rather dull purplish-red. In size the rosettes are very variable, and the largest form, often 3 inches across, has been designated *S. montanum Burnatii*. More attractive is the variety *stiriacum*, of which the rosette is smaller than *Burnatii*. The leaves of this are very narrow and heavily tipped with dark brown, which becomes almost black on the leaves of the flowering stem and gives the plant a very quaint appearance.

S. pumilum is a compact little species from the Caucasus, with rosettes not unlike some small forms of *montanum*, but the petals of the flowers are broader, more like those of *S. arachnoideum*, and the colour is a rich dark red. The colour of the rosettes is a greyish-green, assuming in autumn dull opalescent colouring. Another good species from the Caucasus is *S. altum*, discovered in 1935 by Dr. GIUSEPPI at Armchi (between 5,000 and 6,000 feet). Other Sempervivums were collected on this expedition which, I believe, will turn out to be new species, but it is impossible to say definitely until they have flowered. Returning westwards we are brought to the Balkan species. *S. erythraeum* (fig. 79) is one of the most beautiful and, with me, the most susceptible to wet conditions. Even in summer it is apt to damp off during a rainy period, and in winter one may easily lose the whole of one's stock of certain forms unless they be given glass protection. All forms may be distinguished from other species by the multiplicity of leaves, but this is more pronounced in the smaller forms from the Rila Mountains in Bulgaria. In these forms the leaves are narrow and very acute, and vary in colour from grey-green to a lovely opalescent colouring which is practically unique in mountain flora vegetation. This wonderful colouring is equally prevalent in the larger forms from the Pirin mountains which grow on limestone, but here the leaves are broader and not quite so many in number. The faces and backs of the leaves of this species have a very dense covering of fine hairs ; the petals of the flowers are a rich red with a lighter margin. I strongly recommend this species for the Alpine House, but it should only be grown in the open by those who are prepared to give it the protection of a cloche in winter.

The other two red-flowered Balkan species are *S. Kosaninii* and *S. macedonicum*. *S. Kosaninii* has medium-sized hairy rosettes, and

the young rosettes are carried on long and very thick stolons; *S. macedonicum* (fig. 80) also has strong stolons, and is rather like a flattened form of *S. montanum*. Both are interesting plants and should be included in every collection of the species, though they have no special decorative value.

Dr. PRAEGER makes no mention in his Account of the Sempervivum Group of any Spanish species, but two species were described some years ago and further plants have since been found by Dr. GIUSEPPI and others, which will doubtless prove to be new species. Of the named species *S. cantabricum* only seems to be in cultivation. A brief description appears in the JOURNAL R.H.S., 60, 520 (1935), and a more detailed one in FEDDE, Repert. Sp. Nov. xxxiii, 363-66 (1934). The rosette is very handsome and distinct, and it is not difficult to grow, though—with me—somewhat slow to increase.

Before leaving the red-flowered species, mention must be made of *S. atlanticum* with its grass-green rosettes which are incurved in summer and very prolific with young rosettes, so that the plant soon becomes very tufted and congested, unless the birds pull it to pieces as they are only too prone to do. This is known only on the Great Atlas mountains in Morocco, and is the sole African representative of the hardy section of the genus.

The yellow-flowered group of Eusempervivum species includes the following: *S. Wulfenii*, *S. ciliosum*, *S. grandiflorum*, *S. Kindingeri*, *S. leucanthum*, *S. Pittonii*, and *S. ruthenicum*. The rosette leaves of all these are more or less hairy with the exception of *S. Wulfenii*, which has glabrous leaves and strongly resembles *S. tectorum glaucum*. The centre leaves of the rosette of *S. Wulfenii*, are, however, more incurved than those of *S. tectorum*, in fact the centre is usually quite conical in shape, and this will generally enable one to identify the plant when flowers are not present. It is the slowest to increase of all Sempervivums and never seems to produce more than two or three offsets on very thick stolons in a season. Moreover it is very impatient of winter wet and will often damp off if it is not given glass protection. It appreciates a soil rich in lime.

S. grandiflorum is a good species and can always be known by the unpleasant smell of its leaves when bruised, a smell rather like decaying vegetation. In summer the leaves are quite sticky to the touch, unlike the leaves of *S. montanum Burnatii*, which in many ways certain forms closely resemble. The flowers, as the name denotes, are large and the petals are of a clear yellow with a purple base. It has given birth to interesting natural hybrids with *S. arachnoideum*, *S. montanum* and *S. tectorum*. *S. ciliosum*, *S. Kindingeri*, *S. leucanthum* and *S. Pittonii* are Balkan species, and are all interesting plants. The Kew Hand-list of Rock Garden Plants (1934) replaces the name *S. ruthenicum* Koch ex Velen. of PRAEGER's Account by *S. armenum* Boissier, and this is correct, provided these names apply to the same species; but considerable confusion still exists concerning this species. Dr. PRAEGER mentions a form of *S. ruthenicum* having pure yellow

petals, the petals of the type having a purple base. Moreover, plants are in cultivation under this name which show very considerable variation in other respects, *e.g.* the length of the stolons, so that it seems better to leave the nomenclature of this complex in abeyance pending the study of freshly collected material.

S. ciliosum is one of the best-known and most distinctive plants in this group. The rosette leaves are quite "shaggy," with long hairs on face and back as well as at the edges. It looks delightful in a crevice, and the petals of the flowers are of quite a good yellow though rather narrow. The form *Borisii* has even longer hairs than the type, and in summer the outsides of the green rosettes are more heavily stained with dark red. It absorbs water like a sponge and demands good drainage and a sheet of glass in winter. Further, it must be divided frequently to keep it in good health. *S. Kindingeri* is one of the rarest species, and is only known in one station in Macedonia. The rosettes are quite large and very hairy, of a rather sombre shade of green. *S. leucanthum* and *S. Pittonii* are smaller plants and very similar in appearance to each other. The hairs on *S. leucanthum* are longer, and its leaves are rather more incurving, and lack the deep brown tips of those of *S. Pittonii*. The flowers of both are small and pale greenish-yellow, whereas those of *S. Kindingeri* have yellow petals with a purple base.

Perhaps the most interesting plant in the genus is *S. versicolor* (fig. 81), which in general appearance resembles *S. tectorum*, but the petals are pale yellow when they first open and later change to pale lilac. It only grows, as far as is known, on the roofs of houses in Lovéc and some other villages at the foot of the Balkan range. Its parentage is a puzzle.

Before I conclude I must say a few words about cultivation. As I have already stated, the smaller species are essentially rock-plants, and they will thrive in dry positions and with very little soil provided the soil is rich in humus, but the larger species are gross feeders and quickly exhaust the soil in their immediate neighbourhood. For this reason the larger species will seldom do really well if left in the same pan of soil for more than two or three years, and when they are repotted, preferably in March, as much of the old soil as possible should be removed from the roots. All species appreciate a soil rich in humus provided they are given adequate drainage. If one of the peat-moss products be used instead of leaf-mould, some extra food must be provided, and for this purpose nothing is better than bone-meal. I find that for cultivation in pans 20 per cent. of sand in the soil mixture is advisable, but in the garden a loose soil texture should be avoided, as it tends to facilitate the depredations of birds.

Those who prefer to grow their *Sempervivums* in pans will probably find that a collection of any size will quickly outgrow the accommodation available in the Alpine House. Yet pans standing on the ground are very unsatisfactory: the plants do not show up to advantage; and it gives the best possible opportunity to dogs, cats, birds, slugs

and woodlice to test the vital powers of the *Sempervivum*. Where space is available in a sunny position in the garden it is an excellent plan to mount greenhouse staging on brick supports about 2 feet 6 inches from the ground. Pans on this will look well during the summer, and for the winter months a temporary wooden framework can be made to fix to the staging with bolts, and on this can be fastened, with hooks, ordinary frame lights. Under such a shelter there will be little chance of damping off, and an occasional watering, preferably with a weak solution of permanganate, which seems to prevent disease, will be all the attention the plants will require from October to March.

It appears to me that the size to which the rosette of any *Sempervivum* will grow is partially dependent upon the size of the parent rosette. For example, should the rosettes of *S. calcaratum* become very congested and consequently small, an offset from one of these rosettes will never attain any great size. Only by selective breeding can really large rosettes be obtained. This is entirely my own theory and is very likely absurd, but it is undoubtedly true that, to obtain large rosettes, all offsets must be removed as soon as possible.

It is not always realized, apparently, that the *Sempervivum* rosette is monocarpic, *i.e.* it almost invariably dies after flowering. Fortunately the young rosettes generally survive to carry on the family, but occasionally the stolons become subsidiary flowering shoots, and then the whole of the plant is doomed. It is hopeless to collect seed, unless the flowers have been protected with muslin, as they are nearly always cross-fertilized. This, however, only applies to the *Eusempervivum* section; no hybrids are known of which one (or more) of the parents belongs to the *Jovisbarba* section. Thus it is easy to obtain a stock of *S. Heuffelii* from seed, whereas it is only possible to do so otherwise by severing rosettes from the rootstock with a sharp knife and then rooting them in sand.

I feel that a word of warning should be given regarding the fungus *Endophyllum Sempervivi*. Luckily, it is not common among cultivated plants, but in the wild whole areas are affected. For example, last year on Wengen Alp I found many rosettes of *S. montanum* so badly affected that they were almost unrecognizable. The leaves, generally on one side of the rosette, become much elongated, often to two or three times their normal length, and usually their colour becomes a pale yellowish-green. I did *not* collect any specimens from that district!

Any diseased rosettes found in the garden should be promptly burnt; but it should be noted that rosettes will often become lopsided in periods of drought, although the fungus is not present.

In conclusion I should like to say, and I am sure that you will all agree, that it is very much easier to grow *Sempervivums* than to name them.

THE PLACE OF VEGETABLES AND FRESH FRUIT IN THE WELL-BALANCED DIET.

By G. E. FRIEND, M.A. (Oxon.), M.R.C.S., L.R.C.P.
(Christ's Hospital, Horsham).

[Read April 15, 1937 ; Sir LIONEL EARLE in the Chair.]

It would be a presumption on my part were I to address you to-day as an authority on this subject. I may, however, without undue presumption outline, as completely as I can in a short paper, first, some of the more authoritative pronouncements that have recently been made on this important subject, and second, however inadequately I may do it, incorporate some aspects of the problem collected from my own experience during the last thirty-two years. During this period it has been my lot to watch the health of several thousand individuals in three closed communities, the first eight years in two hospitals, and the last twenty-four in a large public school. Of the hospital periods I shall say nothing, but something of the twenty-four years spent at Christ's Hospital, as this period practically coincides with the beginning and the growth of our modern dietetic knowledge. It is impossible to watch the health of a large school community of nearly 1,200 individuals with an average yearly total of some 3,000 cases of accident or disease, without becoming convinced from clinical experience of the direct bearing that diet has on health. It is true the great majority of these 3,000 yearly patients consists of cases of minor illness or casualty, but it is from the observation of these minor cases, in sufficient number and over a sufficiently long period, that one is forced to the conviction that much of this minor invalidity is in the main due to, and is certainly prolonged by, some deficiency of the protective substances in the diet.

As Sir ROBERT MCCARRISON has repeatedly said, in this country severe degrees of the particular deficiency diseases (xerophthalmia, beri-beri, pellagra, scurvy, etc.) are seldom encountered outside the laboratory, but milder degrees are much more common. He says in his Cantor Lectures: "Since 1921 I have used every occasion to emphasise that it is the lesser degrees of vitamin deficiency, and the less obvious manifestations of such deficiency that are of importance in Western Countries. A recognition of this fact is, I believe, essential to the prevention and cure of many of the commoner sicknesses of mankind—sickness to which we cannot always attach a diagnostic label. It is rare that the food of human beings is totally devoid of any one vitamin, it is more usual for the deficiency to be partial and for more than one vitamin to be partially deficient ; it is more usual still for partial deficiency of vitamins to be associated with deficiency

of suitable protein and inorganic salts, and with an excessive richness of the food in carbohydrates."

Again, to quote from a recent broadsheet issued by P.E.P. : " There is now no question of the vital importance of the absorption of certain elements in food, some known, others elusive, which together serve to build up the body and to maintain it in a state of protection from illness. These elements are naturally present in most varied diets, but may be seriously deficient in one-sided or low-grade diets. ' Starvation,' therefore, has two quite distinct aspects—the quantity aspect (lack of sufficient calories) and a quality aspect (lack of one or more specific protective substances necessary for the maintenance of perfect health). Government has ensured, with a fair degree of success, that no one in Britain need go hungry, but hunger, it is now shown, is not a sufficient test, for a person getting enough bulk of food and calories to stave off hunger may still be suffering a serious deficiency of one or more protective food elements, such as various vitamins or minerals. Thorough re-examination of the available evidence shows that even in the lowest income groups shortage of calories cannot affect more than a small number of persons. On the other hand, shortage of protective food elements undoubtedly affects millions of persons, and it must be remembered that such shortage may take many forms. It may take the form of a shortage of one or two specific elements, such as the well-known case of shortage of iodine, causing goitre, or it may take the form of a more general shortage with more widespread but possibly less clearly marked effects on health."

Now these protective substances are of course the various vitamins and the inorganic mineral salts, some twenty of which are found in the human body, and eleven of which are definitely proved to be essentials to healthy growth and maintenance. Quite naturally, the vitamins have had the better Press and have captured public attention. It is certain, however, that the minerals are no less important. Except in the lowest income groups the supply of calories is adequate. It is the balance of the foodstuffs supplying these calories that is often wrong, and is the cause of a greater or lesser shortage in the vitamins and mineral salts. Where such a shortage exists (and it is more frequently present than is generally realized) its correction is of much greater moment for those in the lower income groups than in the higher.

The vitamins that chiefly concern us to-day are : A, B-complex, C, and perhaps E. The minerals are calcium, phosphorus, iron, iodine, sodium, magnesium, copper, chlorine, and sulphur, all of which occur in most plants and fruits. These ' protective substances ' are found in varying amounts in most of the fresh vegetable foodstuffs—some in one, some in another, but, I think, not all in any one. Hence the importance of the mixed diet in the matter of proper balance.

Lord HORDER, in a recent wireless talk, quoted again the physiologist who said " take care of the mixed diet (or calories) and the vitamins will take care of themselves." This is true both of

vitamins and mineral salts, provided one has sufficient knowledge of the constituents of the various foodstuffs in his diet, but not otherwise. The variety is often not sufficient, nor of the right kind to ensure an adequate supply of them. Take the case of iron as given by Sir ROBERT McCARRISON, who puts the daily loss of iron from the body at about 10 mg., and the iron content of the average diet as from 5 to 10 mg., frequently as low as 5 mg. He says: "it is apparent therefore that the average diet is not varied enough to provide a sufficiency of this most important element, nor is it always varied enough to provide a sufficient amount of lime. The truth is that the common belief—safety in variety—is likely to be misleading; for, as McCOLLUM showed, one can ring the changes on a great variety of foodstuffs—muscle meats, cereal grains, tubers, roots, potatoes, peas and beans, and yet have failure of nutrition unless the diet contains a sufficiency of the protective foods—milk and green leafy vegetables. This applies to vitamins as well as to mineral elements."

The Advisory Committee on Nutrition, in its first report just issued, in comparing the quantities of food available with the nutrition requirements suggested by the Technical Commission of the League of Nations Health Organization says: "There is, however, good reason to believe that the national consumption of fruit and vegetables is below the nutritional optimum, and that this deficiency is predominantly to be found in the poorer sections of the population."

It quotes the following figures for the years 1934 and 1935.

	Total (ooo tons).	Percentage Imported.	Percentage Home grown.
Fruit	2,432	77	23
Potatoes	4,629	3	97
Other vegetables	2,425	25	75

	Consumption per head per week, United Kingdom.			Increase (+) or decrease (—) of 1934-5 compared with	
	1909-13. lbs.	1924-8. lbs.	1934-5. lbs.	1909-13. Per Cent.	1924-8. Per Cent.
Fruit	1.19	1.75	2.23	+ 87	+ 27
Potatoes	4.68	4.43	4.25	— 9	— 4
Other vegetables	1.38	1.81	2.22	+ 61	+ 23

While the increased consumption of fruit and other vegetables now, as compared with both 1924-8 and the pre-War figures, is a step in the right direction, it is not enough to ensure safety, as admittedly the larger totals are still below the nutritional requirements and in addition there is an appreciable drop in the per head consumption of potatoes (a valuable protective food). The drop also found in the consumption of cereals is sufficient to reduce the margin of safety in respect of iron and B.1 vitamin. Probably a chief cause of this drop is the increase in the consumption of sugar—approximately 0.5 oz. per head per day over the periods under review, but much larger than this over the past fifty years. The excessive use of refined sugar is, I believe, the chief cause of lack of appetite for plain foods, and is quite possibly at the root of much minor sickness. During the period of war rations, when the consumption of sugar was strictly limited, appetites were



FIG 81 — *SEMPERVIVUM VIRICOLOR*



FIG 82 —SLMPERVIVUMS IN MR MILLER'S GARDEN

better (so much so that there was even a craving for fat and vegetables, both markedly absent in the pre- and post-war schoolboy)—catarrhal infections and chronic septic conditions of the skin were less frequent and the total medical invalidity was less. With the better diet, or the increase in its sugar, the reverse appears to be the rule. This increasing use of refined sugar, which over the past fifty years is much greater than the figures given in the Advisory Committee's Report show for the periods since 1909, may be the result of a sugar habit induced by advertisement, cheap supply or mass suggestion as has been variously stated, but it may also be the result of a gradual change in the natural balance of the national diet due to the sophistication of foodstuffs and economic causes, with the setting up of a vicious circle. We must return to simple foodstuffs, to the use of the whole grain, a more extended use of milk and meat offals (why should we only eat the tough muscles ?) and an extended use of fresh vegetables and fruit.

It is probable that under such improved conditions the indications for adequate nutrition outlined by E. F. TERROINE in the Quarterly Bulletin of the League of Nations would be realized. These are :

(a) Energy expenditure should be amply covered by *foods* rich in carbohydrates.

(b) Small amounts of animal foods, preferably milk, should be added as appetizers or to raise the protein level if necessary.

(c) Fresh fruit and raw vegetables should be included for ballast, minerals and vitamins.

He is reported as saying that the old diet of the peasant in which bread, potatoes, legumes, green vegetables, fruit and milk formed the bulk, in which meat was used only as an appetizer, is the most reasonable practice.

Such a diet would satisfy the requirements now generally considered necessary for the maintenance of health and efficiency, provided the quality was right, and would probably prove that the accepted standard of 100 grams of protein was in excess of that necessary for optimum health.

Lord HORDER put the problem very neatly into a nutshell in his talk the other night. He said : " Hunger is not a safe guide to nutrition. A man may fill his belly with food and so feel satisfied, yet he may be under-nourished. And he may be well-nourished and to spare, yet feel hungry. It is matters like these that science helps us to understand. We must be careful all the same not to mistake pseudo-science for the real thing. The shibboleths of pseudo-science can easily become 'ramps' by being commercialized. Science can easily be prostituted to business ends. There is an easy 'rake off' in the form of some patent foods and health gadgets offered to the public with claims that quite often have no scientific justification. Truly, 'where the carcass is, there will the vultures be gathered together.' "

I have said enough to indicate the real importance, first and all the time, of these protective food elements in nutrition, and it is in this

direction that both the public, whether consumers or producers, and the medical profession as advisers need educating. These substances not only can be, but are, in fact, much more valuable and much more safely supplied in natural foods than in artificial preparations.

In a recent letter to the *British Medical Journal*, Dr. ARBOUR STEPHENS wrote: "We can hope to have a healthy nation only when we realize that men, animals and soil are inseparably interdependent. Their health-rates rise and fall together. If we do not feed the soil—which in these days is ravenous—we cannot expect the cows to get good food, and if cows are badly fed they become predisposed to so many diseases that the milk and the meat must suffer." Had he included "crops" as well as cows his statement would have served as a definition of the whole duty of the preventive physician.

Sir ALBERT HOWARD has for years preached the same gospel, and in a recent lecture sums up his experience in five principles, the fourth of which contains a message we shall do well to digest. It is this: "Soil fertility is ultimately the foundation of quality and disease resistance in crops, in the animals which consume these crops, and in the human beings which feed on both. The public health system of the future will have to be based on soil fertility. Once this is realized by the urban population, agriculture will be regarded as the most important of our industries: the land and those who cultivate it will then come into their own."

Excluding the legumes, the plant foods contain minute amounts of protein and fat, larger amounts of usable carbohydrates such as starch and soluble sugars, some cellulose—and the unusable hemi-celluloses and fibre. But especially they provide between them all the vitamins except D, and most of the essential mineral salts. They are partly energy providers but more protectors and sources of ballast. Their value is in direct proportion to their freshness and their youth. Excluding potatoes the average amount available per head per week is stated to be at the present time 2.22 lb., which with the 2.23 lb. of fruit available is known to be unevenly distributed. Twenty-five per cent. of the vegetable and 77 per cent. of the fruit supply is at present imported. Further, this supply falls short of national requirements for optimum health. This means that on the estimated figures in the Advisory Committee's Report at least 2,000,000 tons of fruit and 600,000 tons of vegetables are now imported. Much of this fruit can probably be better produced in our own Dominions and imported, but all the vegetables required ought to be home grown. The problem would seem to be to agree a system that allows of a supply that is sufficient quantitatively, qualitatively, and economically to the consumer, and at the same time yields a reasonable profit to the producer.

Mechanization is everywhere producing a famine by cutting off the supply of organic manure, and the consequent soil starvation must in the end only be increased by the excessive use of artificials. There is enough waste material available, and Sir ALBERT HOWARD has shown us how it may be used to make the humus. An extension of

market gardening by the continuous cropping method developed by Mr. SECRETT, combined with an extension of the allotment system, fed by the Indore process, will provide clean, healthy and quick production, and with the prompt and adequate distribution of the vegetables so grown will prove one of the most, if not the most important stone in the foundations now being laid for National Physical Fitness.

REFERENCES.

- MCCARRISON, Sir ROBERT : Cantor Lectures, 1936.
 PLANNING : No. 88, December 15, 1936.
 HORDER, Lord : " Towards National Health," *The Listener*, April 7, 1937.
 MCCOLLUM : *American Journal of Physiology*.
 ADVISORY COMMITTEE ON NUTRITION : 1st Report, 1937.
 STANFORD UNIVERSITY, CALIFORNIA : " Consumption of Sugar—Wheat Studies of the Food Research Institute." Vol. 2, No. 8, July 1926.
 ARMSTRONG : Prof. H. E., F.R.S. : " Public Health and Agriculture." *Journal Royal Society of Arts*, 4353, 1936.
 TERROINE, E. F. : " The Protein Component in the Human Diet." *Quarterly Bulletin Health Organisation*. League of Nations, vol. v, 1936.
 BRITISH MEDICAL ASSOCIATION : Report of Committee on Nutrition, 1933.
 STEPHENS, G. ARBOUR, M.D. : *British Medical Journal*, April 10, 1937.
 HOWARD, Sir ALBERT : " The Restoration and Maintenance of Fertility." *Farmers' Club Journal*, February 1937.
 — " The Manufacture of Humus by the Indore Process." *Journal Royal Society of Arts*, No. 4331, 1935.
 MCCANCE, R. A., and LAWRENCE, R. B. : " The Carbohydrate Content of Foods." M.R.C. Special Report No. 135.
 MCCANCE, R. A., and OTHERS : " The Nutritive Value of Fruits and Vegetables." M.R.C. Special Report No. 213.
 SECRETT, F. A. : " Modern Methods of Vegetable Production and Marketing." *Journal Royal Society of Arts*, No. 4334, 1935.

DISCUSSION.

Prof. H. E. ARMSTRONG : It has been my privilege to be associated with Dr. FRIEND since he took medical charge of Christ's Hospital School twenty-four years ago. He has placed the school at the head of such institutions by the care and devotion with which he has watched over the boys' health, particularly with regard to their food.

Food, I should say, is provided at the cost of the Foundation, under the administration of the Treasurer and the office authorities. The boys (over 800) live in "houses," taking their meals together in Great Hall, adjoining the kitchen. The school has a farm, with 50 cows (herd 100), producing all the milk that is required : this department is looked after exceptionally well. The milk is used unsterilized. We were the first, in a special experiment in 1931-32, promoted by I.C.I. and the Distillers' Company, with the aid of Prof. DRUMMOND and Dr. EYRE, to test the value of summer-cut dried grass as a winter fodder and to assure ourselves that if such were available, the food value of the milk in winter might certainly be raised. Dr. FRIEND has recorded his experiences in his book, *The Schoolboy—A Study of his Nutrition, Physical Development and Health* (W. Heffer & Sons, Cambridge).

The task imposed upon a school like Christ's Hospital in feeding its boys is one of great difficulty.

In the first place, due economy has to be observed. There is a constant struggle between those concerned : we have not yet succeeded in inducing farm and kitchen to value produce from the same level—farm wants more for its pigs than kitchen is prepared to give ; the killing presents difficulties at times.

Vegetables are a great difficulty—no one understands them nor is prepared to give them the attention they deserve—large quantities are grown to waste. Not a leaf should be thrown away, but all that is not directly eaten boiled down to vegetable soup.

As Dr. FRIEND remarks, the period during which he has been active at the school is practically coincident with that in which the growth of scientific understanding of the subject has taken place.

No word is to be found in a public lecture I gave at Manchester full fifty years ago on ' Food ' indicating anything to be of special importance beyond carbohydrate, fat and protein. At most, in a vague way, French habits, their use of salads, had impressed us, and also the Scots' use of oatmeal and their respect for all vegetables. In this, as in all similar matters, advance could only follow understanding. Both cause and cure of scurvy were well known a century and a half ago, but could not be recognized owing to lack of understanding. By a stroke of the pen—by the substitution of lime for lemon—the remedy that was discovered was set aside on grounds of commercial expediency. To-day, advertisement and big business combine to favour irrational considerations, particularly in bread. The bread problem is as yet by no means solved. Wholemeal is not by any means the same thing as whole grain. The great difficulty is to produce a palatable loaf that contains a sufficient supply of bran and germ. When Sir THOMAS BARLOW discovered his disease in the houses of the rich—that the children were too carefully fed and victims of scurvy and rickets—his colleagues took little notice. Pasteur had so enslaved them. Little less than a chance observation—a few drops of milk added to rats' diet—the effect this had in stimulating growth—gave rise to the final conflagration, but this spread only because of the store of combustible matter prepared for use.

Now suddenly we see that all forces must be joined in the study of food, health being the outcome of proper feeding. We know very little and can only go slowly—still there is much experience to guide us. The whole community is concerned.

The chief difficulty is the boy himself—boys are kittle folk ; they are so full of fads and fancies. A whole house will suddenly take exception to a particular food. Cooking is in no way what it should be. Boys are taught nothing about food.

Until it becomes a religion little progress will be made. Work has to be done to prepare the way for food—this and exercise must come before lessons. The object must be to sharpen the appetite up to the edge of full expectation and satisfy it so as to meet all needs—when we know these.

Forty years ago I dreamed a dream. I had a vision of school

life. I secured a considerable plot of ground as an experimental field for the study of agriculture. This has never yet been used as I intended.

We send all our great boarding schools into the country and then make no use of it; actually the course of training should be based upon the special opportunities afforded by country surroundings—the opportunity these alone give of understanding the world we live in. Even the sewage farm will be treated as of special value, owing to the opportunity it affords of studying biological problems. Actually now, these things make no appeal either to the Governing Body or to the Teaching Staff.

The school of the future—the long-distant future—will be the farm. Christ's Hospital stands out as having pointed the way.

Sir ALBERT HOWARD: Mr. Chairman, ladies and gentlemen, the point I would like to speak on, arising out of this most interesting paper of Dr. FRIEND's, is one which is concerned with the future rather than with the present. My point is this: I think the public health system of the future must be based on soil fertility. We shall not get very much further, I think, by having more of these conferences on nutrition and on health, or by a continuance of the researches which have been carried out. And I say that for this reason: that a great deal of the enquiry must now be conducted with fruits and vegetables which are not properly grown; and if we start from the wrong base-line, however able in other respects the research may be, we shall be investigating a series of what may be termed mares' nests, *i.e.* we shall be enquiring into problems which need not have arisen. My experience on this question of growth of plants and the feeding of animals has been that if we start on the basis of fertility problems in regard to the soil it becomes a simple question. On the basis of soil fertility we can grow crops which are not attacked by disease at all. I will give some instances of that.

If we take fruit growing in the region of the world where its cultivation started, that is to say, Central Asia, we find that the spraying machine had and has practically never been heard of, and fungus and other diseases are practically never heard of there. People there have not seen nor heard of artificial manures, and yet they grow extraordinarily good vegetables and fruit; their varieties are very old, they can be traced back hundreds of years; they do not run out, as Strawberry cultivation in this country, for instance, does, such as in the area round Southampton, where Strawberries last only a short time. That, I say, is not so in the old agricultures, where the people are growing things properly on the basis of soil fertility. Those of us who have passed our sixtieth year will have noticed that the artificial manure industry and that for the manufacture of spraying machines have developed together. It is when we poison the land that we see these diseases, and then we treat the produce by means of poison sprays. But, as I have said, you do not find that in the case of the old cultures in either vegetables or fruit.

Therefore we shall not get much further in our study of this important subject on the old lines ; we must get the right line of research in regard to fruit, vegetables, milk, meat, wheat. Then we shall have a proper foundation, as it were, for research on our experiences.

Being rather convinced on this point as a result of long experience, I used, when I was employed by the Government of India, to employ diseases from plants and animals in order to teach agriculture. When using diseases of plants to teach post-graduate professors, one has to find out how to grow a crop which has not the disease, and that means going over one's practice and one's varieties very carefully. I did that for many years, and succeeded, and then I learned agriculture. I did not learn it in the University—I learned theories there. That is the reverse of what is being done now : disease comes, and people go in for spraying, and in that way they destroy their evidence ; certainly it does not solve the problem. Also in regard to animals : in feeding my animals properly for many years I did not have them inoculated ; I allowed the diseased animals to mix with the others, and I had no further cases of disease, because the bulk of the animals were so healthy that they put up a resistance to the disease and did not catch it.

It seems to me that the next step in the admirable work which has been carried on at Christ's Hospital in all these years by Dr. FRIEND, which is an extraordinarily valuable foundation on which we can build, is that we shall have to get, in this and other countries, small communities who are fed on produce raised properly on fertile soil, that is, properly-grown vegetables, fruit, wheat, and so on. These must be self-contained units. Then, I think, we shall get the results which we all desire, for 50 per cent., perhaps 75 per cent., of minor ailments will pass away. At present they are mares' nests ; they are nutritional defects, as is so well shown by McCARRISON's work.

I had an opportunity, some days ago, to talk to one of our most extraordinary men, Dr. ROCKMAN, Head of the Health Section of the League, a branch of the League of Nations financed by American Trusts. I wrote a memorandum, and my thesis was that the public health of the future must be based on fertility of the soil. It is of no use to investigate fruits and vegetables as they are grown now ; we must get the best that mother Earth can produce, and start investigations on the result ; and if we could have, in this country, a few self-contained institutions which could carry on this valuable work which was set going at Christ's Hospital, we should have solid ground for the next advance.

Prof. DRUMMOND : Mr. Chairman, ladies and gentlemen, I have been very greatly interested in what Dr. FRIEND has told you. I have been privileged to see much of that gentleman's work at Christ's Hospital, and I am able to confirm the statements as to the effect which the diet had on the boys there. I think that an extraordinary thing about vegetables is that we are only now just beginning to eat them in appreciable amounts. Some of us have recently been making an historical study of the English diets. It is difficult to come upon

reliable information about early diets in this country, *i.e.* in the early part of the Middle Ages, but there is some evidence that the common people ate herbs and vegetables. But when we come down to Tudor times we find that the custom of eating vegetables practically disappeared; not only were they not consumed, but in the medical works of the period there is a definite suggestion that they are harmful, and that is even more the case in regard to fruit. In the sixteenth, seventeenth and eighteenth centuries there are constant references, particularly with regard to children, against giving people fruit and vegetables. It was a survival of that teaching which came down to Victorian times that was largely responsible for the comparatively small consumption of fruit and vegetables in the United Kingdom. I was interested to try to trace why this belief became established in the minds of medical men. I think there can be little doubt—though it is naturally difficult to be certain about it—that it was connected with the extraordinary death-rate, of children especially, in the summer months, from so-called “summer diarrhœa.” In a hot summer, in those days, the death-rate from this cause might be as high as 20 per cent. or even 30 per cent. in certain areas, truly fantastically grave rates, as judged by modern standards. And the only possible factor which medical men in those days could see as a cause was the eating of fruit and vegetables; they certainly held those things were responsible for the fever. That may be the reason why fruit and vegetables disappeared from the tables of the people at that part of our history, and it lasted for about three centuries. The custom of eating fruit and vegetables is now slowly coming back.

A point made by Dr. FRIEND, and which I would like to emphasize, is that we still know comparatively little about the nutritive values of various vegetables and fruits. There are some nine or ten vitamins known already, and there must be other factors, as yet undiscovered, because it is the experience of those who carry out experimental work on these food factors that if there is any form of food deficiency, the administering of fresh fruit and vegetables clears it up. Fruits and vegetables, therefore, contain much primary nutritional value.

COMMERCIAL FRUIT TRIALS AT WISLEY, 1936.

As already reported (see JOURNAL R.H.S. 60, p. 436) the disastrous frosts of May 1935 ruined all prospect of fruits in the trial orchards at Wisley; the present report deals therefore in the main with observations made during 1936.

The area of the trials and their arrangement remains as it was at the time of the last Report (see JOURNAL R.H.S. 60, p. 119), but several new varieties of most kinds of fruit have been planted on land previously occupied by varieties now discarded (see last Report).

The Joint Fruit Trials Committee (see p. 53) met at Wisley to inspect the trials on July 10, August 21, and September 24, 1936, and at the last meeting officials from the sub-stations and members of the gardening Press were also present.

The following fruits were selected by the Judging Committee for propagation and distribution to the sub-stations for extended trial:—

Strawberries.—‘Corvallis’ and ‘Western Queen.’

Raspberries.—‘Duke of Cornwall’ and ‘Mayfair.’

Plums.—‘Delicious’ and ‘Marjorie’s Seedling.’

Apple.—‘Sowman’s Seedling.’

Since the publication of the last report, the undermentioned varieties have been accepted for trial and are established at Wisley:—

Apples.—‘Bascombe’s Mystery,’ a late-keeping culinary variety, sent by Mr. W. G. Kent, Fruit Advisory Officer, Kent. ‘Winter King,’ a brightly-coloured late dessert apple, raised by Messrs. Pope Bros., Barkham, Wokingham, and the following seedlings, raised at the John Innes Horticultural Institute, Mostyn Road, Merton Park, S.W. 19. Seedling 530—An early dessert apple. Seedling 920—A late dessert apple. Seedling 925—A mid-season dessert apple.

Strawberries.—‘Catskill,’ ‘Clermont’ and ‘Culver,’ sent by Dr. G. S. Slate, New York Experimental Station, Geneva, New York.

Raspberries.—‘Newburgh’ and ‘Taylor,’ sent by Dr. G. S. Slate, New York Experimental Station, Geneva, New York.

Propagating material of the following continental varieties of Apples, Cherries, Pear, and Plums has been received through Sir Daniel Hall, from Yugo-Slavia, and the Institute of Plant Industry, Leningrad, U.S.S.R.

Apples.—‘Boudinica’ (White), ‘Kolatchara’ (Red), ‘Tetowica.’

Cherries.—‘Anadolskaya,’ ‘Koslorskaia,’ ‘Lotovaya,’ ‘Luibskaya,’ *‘North Ceaity,’ 4885 ‘Nikitskaya Chornaya’ (Nikita Black), 3493 ‘Nikitskaya Chornaya’ (Nikita Black), ‘Ochrida’ (Black), *‘Ochrida’ (Red), ‘Ochrida’ (Red cracking), 4895 ‘Odesskaya Chornaya’ (Odessa Black), ‘Postovatskaia,’ ‘Sphanka,’ ‘Shubinca,’ *‘Vasievka,’ ‘Vladimir,’ ‘Vladimiskaya,’ ‘Zolotaya’ (Golden).

Pear.—'Karamanka.'

Plums.—*'Achakow,' 'Chernostew of Kozlow,' *'Early Black,' 'Manchurian Beauty,' 'Keen of Bosnia,' 'Projegatcha,' 'Poulkowa,' 'Radchenko's Yellow,' No. 03267/556, 'Red of Winter,' *'Reine Claud Reform,' *'Thorn to Dessert' (Michurin), 'Thorn Sweet' (Michurin), 'Ussurian' No. 6551, 'Ussurian' (White early), 'Ussurian' (White great).

Stocks of these varieties have been successfully propagated, with the exception of the Cherries and Plums indicated by an asterisk, the grafts of which were dead on arrival.

The following varieties have been added to the standard collections :—

Apples.—'Amber,' 'Beryl,' 'Coral,' 'Diamond,' 'Garnet,' 'Gem,' 'Jade,' 'Jewel,' 'Opal,' 'Onyx,' 'Pearl,' 'Ruby,' 'Topaz,' all from Messrs. Seabrook, Boreham, Essex; 'Ashmead's Kernel,' 'Belvoir Castle,' 'Maiden's Blush,' 'Prince George,' 'Steyne Seedling,' 'Young's Pinello.'

Raspberries.—'Viking' and 'Dreadnought.'

Strawberry.—'The Seventeenth.'

Plums.—'Ontario' and 'Lindsey Gage' (very similar to Cambridge Gage).

Berry.—'The Boysen Berry.'

In 1936 cropping of all fruits, with the exception of Gooseberries and Black Currants, was generally satisfactory in spite of some frosts experienced during the flowering period.

The following is a summary of observations made on cropping characters for the year under review :—

Apples, Dessert.—Ripening end of July, the earliest dessert variety on trial, 'Laxton's Early Crimson' still falls short of the requisite standard in that it is too small and lacking in flavour.

Beginning to ripen about the same time as 'Beauty of Bath,' the attractive-looking Canadian variety 'Melba' crops consistently and heavily. The great disadvantage of this variety is its softness; in this it may be like some of its overseas brethren, for the fruit may be more or less crushed without discolouring. The fruit is regular, round to oblong, the flesh soft, juicy and sweet. The colour is usually pale green with a red flush and striping, and this improves if the fruit is stored. It will keep into September without the flavour deteriorating.

Ripening towards the end of August 'Laxton's Advance' is proving a good quality Apple, but it has not yet cropped sufficiently in the trials to permit a full report on its behaviour.

Messrs. Laxton's two new varieties 'Epicure' and 'Exquisite' yielded good crops, coming between 'Beauty of Bath' and 'Worcester Pearmain.' 'Epicure' is a prolific variety ripening at the beginning of September; the fruit is of medium size, round, flat, quite well coloured, being flushed and striped with red. It has an extremely long stalk,

and the early good flavour is lost by the middle of September, but the last character may be readjusted as the trees mature. Coming into season about a week after 'Epicure,' 'Exquisite' has proved at Wisley to be an inconsistent cropper; the fruit is irregular, conical, of good quality, and brightly-coloured red.

A mid-September Apple 'Gulval Seedling,' carried a good crop and shows some promise. The fruit is large, round, flat, of fair quality, and coloured with dull red stripes, and flush. This variety was planted in the trials only in 1931.

The new 'Laxton's Fortune' has attracted much attention, and is showing some promise, but a complete report would be premature, as it has only been on trial for two years. The fruit is regular, round to somewhat oblong, and of good quality, possessing a slight Banana-like flavour. The colour is attractive, being almost covered with a bright red flush and stripes.

A variety which has cropped consistently in the trials is 'Redcoat Grieve'—a sport from 'James Grieve.' It is sometimes said that it is identical with the parent, but at Wisley, several differences have been recorded between the two. Although the blocks of the two varieties are practically adjacent, 'Redcoat Grieve' is much more resistant to frost damage; it bears heavier crops; the fruit is more highly coloured, and it ripens several days before the parent. Habit of growth, shape and flavour of fruit, are similar in the two.

'Millicent Barnes' has continued to attract considerable attention as an October Apple, which will keep well into November. The fruit is of medium size, fairly regular, conical, and attractively coloured red, but of fair quality only. It has been suggested that this variety has possibilities of becoming a rival to the imported 'Jonathan.'

'Lord Lambourne' is now widely grown commercially for marketing before 'Cox's Orange Pippin,' and is established at the sub-stations.

Ripening about the same time as 'Lord Lambourne,' and keeping until December, is 'Sunset.' This is a golden-yellow Apple, with a pale red flush. It is of medium size, round, flat, and possesses a good flavour, but little is known of its cropping habit, as it is a comparatively recent introduction to the trials.

No new variety on trial is likely to prove a serious rival to 'Cox's Orange Pippin,' and the only variety worthy of note in season at the same time is 'Woolbrook Pippin.' The young trees of this variety cropped well at Wisley, and the fruit is regular, round flat. The texture is excellent, but the good flavour found at the beginning of its season is lost before it is over. This fault may be corrected when the trees settle down.

'Laxton's Superb' is now well known, but a need exists for a variety to follow it. Whether this place will be filled by the new 'Winter King,' it is as yet too early to say. The few fruits which have been harvested from the young trees were of very attractive appearance, round to conical, and practically covered with a red flush. Flavour and texture are both good, and, although the fruits stored

were taken from young trees, they retained these qualities until February.

The only other dessert variety which need be mentioned is 'Woolbrook Russet,' which again cropped well. This is a dual purpose Apple which will keep until April when it makes a fair dessert sample. The fruit is regular, medium to large, round and somewhat conical, deep green with a slight brown flush.

Apples, Culinary.—Of the most promising culinary Apples, the first of note is 'Arthur Turner.' The behaviour of this variety has been recorded in previous reports, but it has again attracted so much attention in the trials, that a few further remarks are merited. It bears consistently, and while it is not as early as 'Early Victoria,' the large fruits can be picked at the beginning of August when they are much larger than those of the Codlin. The smaller fruits left attain a large size by the beginning of September, and if desired, will keep in sound condition until October. The fruit is a little irregular, large, round, conical, green with an occasional brown flush. Texture firm, and flesh slightly acid. It is an early-flowering variety, but it was observed this year that the frosts experienced after the fruits had set had little effect on the crop. This may, perhaps, be attributed to the large petals of the variety which persist until the fruit is practically mature, providing a certain amount of protection to the immature fruit.

Another early variety of promise is 'Sowman's Seedling.' It is a September Apple, but picking can begin towards the end of August. The young trees of this variety are very vigorous, and have cropped heavily. The fruit is regular, round, flat, and deep green, turning yellow on keeping. Further testing of this variety is necessary before its value can be definitely stated.

Amongst the mid-season culinary varieties 'Howgate Wonder' has attracted most attention this season. It is a vigorous grower, and the fruit is evenly shaped, large, round to oblong, and slightly flattened, green, striped red. Further testing is necessary, as it has only been on trial for three years.

The performance of 'Monarch' has already been recorded. It is now being widely planted commercially, and continues to yield heavily at Wisley.

The last cooking variety calling for mention is 'Crawley Beauty.' Over a period of years this has been the most consistent bearer at Wisley, and this year has again cropped heavily. This consistency of cropping is probably due to its late-flowering habit, for it is the latest of all Apples on trial to flower, and therefore usually escapes injury by spring frosts. The fruit is medium in size, round, flat and evenly shaped, green, brightly-striped red, and texture firm. The fruits are apt to mature a little below the size required of a culinary variety, but rigorous thinning has overcome this drawback.

Plums.—Considerable damage was done by the frost to the early-flowering Plums such as 'Utility,' 'Grand Duke,' 'Early Rivers' and 'Monarch,' but cropping of all other varieties was generally satis-

factory. The outstanding new varieties this year were 'Early Laxton,' 'Bountiful,' 'Delicious,' and 'Marjorie's Seedling.' The performance of the first-mentioned Plum has already been praised in this Journal, and it continues to give satisfaction. The fruit ripens about a week to ten days before that of 'Early Rivers.' It is small to medium, pale yellow flushed claret with a white bloom, and the flavour is of fair dessert quality. Growth is moderately vigorous, and it makes a rather round-headed pendulous tree. It flowers about the same time as 'Early Rivers' and 'Monarch.' The crops of these varieties were severely damaged by the frost, while 'Early Laxton' carried a heavy crop, probably due to its habit of producing foliage before flower combined with the pendulous growth affording a certain amount of protection for the blossoms.

'Bountiful' has given consistently heavy crops during the period it has been under trial, and has again done so in 1936. A dual purpose variety ripening about ten days before 'Victoria' and not unlike that variety in appearance. The medium to large oval fruits are attractively-coloured carmine, speckled with white. The flesh is firm, light golden yellow, of poor dessert flavour, but of good culinary quality. Habit of growth is vigorous, making an upright tree.

'Delicious' is a first-rate dessert variety ripening about mid-September. The fruit is large, oval, tapering to the bluntly-rounded base. It is brightly-coloured red, covered by a bluish bloom. Flesh is a golden yellow of firm texture, very sweet and of rich flavour. Habit of growth is vigorous, upright to a little spreading, and so far it has proved a reliable cropper.

Ripening towards the end of September, and hanging well into October, 'Marjorie's Seedling' is the most promising late Plum received for trial. It is a very vigorous grower, making an upright tree, and of all the varieties growing at Wisley it appears to be the most resistant to bacterial canker, showing very little sign of susceptibility to this disease. Owing to its very vigorous growth it has taken a few years to come into bearing, but is now fruiting satisfactorily, and this year carried a heavy crop. It is of dual purpose, the fruit being large, oval, and the colour a deep purple covered by a blue bloom. Flesh firm, pale yellow, juicy, and of moderate flavour.

Other varieties to crop well were 'Chiver's Cambridge Gage'—the fruit of this variety still has a tendency to split if left on the tree until ripe—'President,' 'Gisborne's,' 'Victoria,' 'Sugar,' 'Swan,' 'Czar,' 'Warwickshire Drooper,' 'Giant Prune,' and 'Stanleot.'

All varieties of Damsons cropped well with the exception of the common Damson, and 'Merryweather' remains the most satisfactory.

Strawberries.—As the Strawberries flowered after the frosts had been experienced no damage was done and the crop was good. The new 'Western Queen' remains the most outstanding variety on trial. So far it has proved a heavy cropper, ripening a few days after 'Royal Sovereign.' In comparison with other varieties its constitution is good, and it still maintains most of the vigour

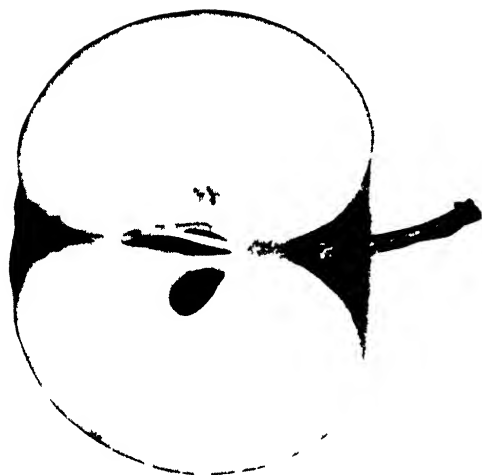
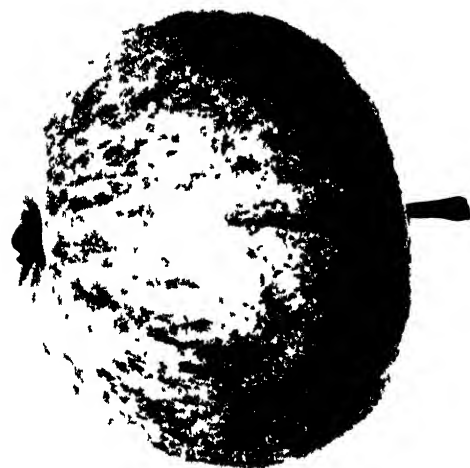


FIG. 83. APPLE FIGURE
(p. 297)

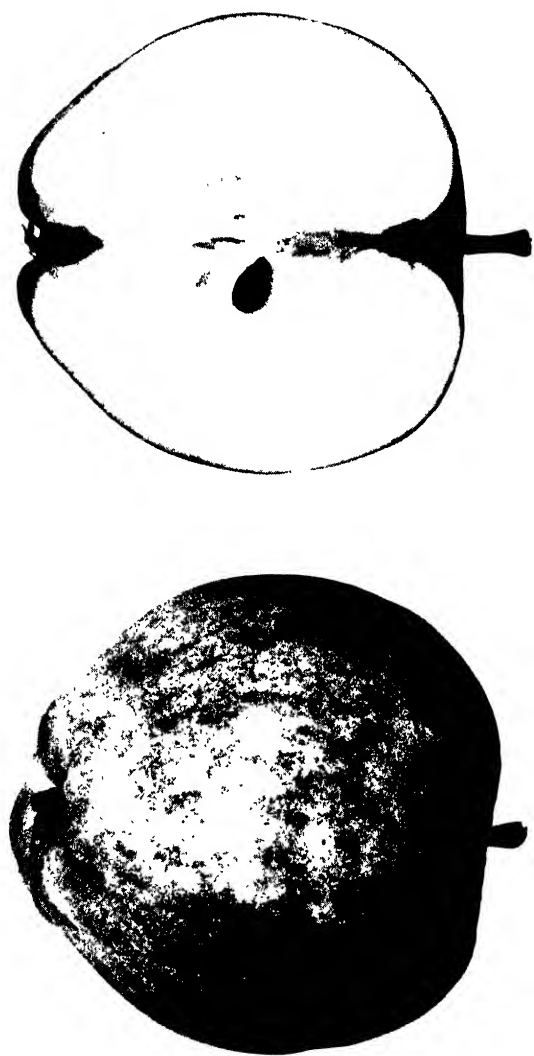


FIG. 84 -- APPLE 'EXQUISITE.'
(p 297)



FIG 85 —PLUM 'EARLY LAXTON
(p 300)



FIG 86 — PLUM BOONHUI
(p 300)

shown when first introduced. The fruit is regular, moderately large, and conical, with a reflexed calyx. Flesh is firm, juicy, and of good flavour. It makes a fairly upright plant, and the pale green upfolded leaves are characteristic.

The American varieties on trial, viz.: 'Corvallis,' 'Red Heart,' 'Ettersberg 121,' 'Clark,' and 'Marshall' fruited for the first time, and two of them promise well. These are 'Corvallis' and 'Marshall.' The former is a very vigorous grower, and if its vigour is maintained will possibly become of commercial value. It is a late variety, the fruit is medium sized, round to conical, juicy, but without outstanding flavour, and perhaps more suited for preserving than for dessert. 'Marshall' is an early Strawberry, of moderate vigour; the flavour is good, but the colour is an unattractive dark red.

'Ettersberg 121' is largely grown in America for preserving, but the stock at Wisley has been found to be mixed, and until it is rogued comment must be reserved. The variety 'Clark' was so badly infected with disease that it has been destroyed, and 'Red Heart' did not crop sufficiently for a preliminary report to be made on its fruiting habit.

All these American varieties, with the exception of 'Clark' will be tested further.

Raspberries.—The crop of most varieties of Raspberries was well above the average. The varieties 'Red Cross' and 'Pyne's Royal' again cropped satisfactorily, but difficulty has been experienced in maintaining a virus-free stock of 'Lloyd George,' and cropping of this variety has not been good. The 'Reigate' which is reputed to be a seedling raised from 'Lloyd George,' cannot be distinguished by any character from the latter variety. The original vigour which seemed to mark it off has now been lost, and the stock in the trial has proved as susceptible to virus as its parent.

The outstanding new variety remains the re-selected stock of 'Brocket Hall.' It again gave a heavy yield and is maintaining satisfactory vigour. Growth is strong, making upright canes from which the trusses are held well out. The fruit is large, round to conical, firm, and easily plugged. This variety was raised by the late Mr. Pateman at Brocket Hall, Hatfield, and the stock is now held by Messrs. Laxton Bros., Bedford.

Two other varieties which were also outstanding were 'Duke of Cornwall' and 'Mayfair.' The former is a very vigorous grower, producing a very upright cane from which the trusses are held well out. Fruit is large, conical, easily plugged, of good flavour, and firm enough to enable it to withstand transit. 'Mayfair' is a comparatively new variety, and promises well. Growth is moderately vigorous, the canes bearing good-sized trusses. The fruit is large, round to conical, fairly firm, plugs easily, and possesses a sweet flavour. Further cropping of this variety is necessary for comparison with the standard varieties.

'Norfolk Giant' remains the most satisfactory late variety. The crop again was good, and no deterioration in vigour has been observed.

The following varieties upon which reports have been published behaved well, 'Epicure,' 'Reward,' 'Matchless,' and 'Bountiful.'

Black Currants.—No records are available of the cropping habits of the newer varieties of the Black Currants, as, with one exception, the fruits were destroyed by the spring frosts.

Wisley trials suggest that varieties in the Victoria group were more resistant to frost injury than those in the Baldwin, Boskoop, or French groups. Typical Victoria types, such as 'Victoria,' 'Goliath,' 'Invincible Giant Prolific,' 'Blacksmith,' and 'Orr's Seedling,' carried light crops. 'Sunrise' (a Boskoop selection) and 'Rosenthal's Black' were the only representatives of the Boskoop group to carry a little fruit, and 'Coulter's Mains' in the Baldwin group seemed a little resistant, but no variety in the French group escaped sufficiently to be worthy of note.

The Canadian variety 'Climax,' which is unclassified at the moment, yielded practically a full crop. This suggests some degree of resistance to frost, since no special conditions of protection applied, but this variety has a very tough skin and it has not been recommended for general planting in consequence.

Gooseberries.—The Gooseberry crop was also largely destroyed by frost. A few varieties, however, produced a light crop confirming the apparent resistance to frost exhibited in 1935. These varieties are :— 'Early Green Hairy,' 'Ingall's Prolific Red,' 'Green Gem,' and 'Lancashire Lad.'

Red Currants.—No new variety has been introduced since the last report was published, and the two outstanding varieties remain 'Laxton's No. 1' and 'Earliest of Fourlands.' Both are maintaining their early promise, and produce a heavier yield than any other variety on trial. Other varieties which cropped well were 'Wilson's Long Bunch,' 'Halle's Long Bunch,' and 'Rivers' Late Red.'

Blackberries.—The new 'Clandon Seedling' and the spineless varieties raised at John Innes Horticultural Institute have only recently been established in the trials, and have not commenced to crop. Amongst the established varieties the early 'Bedford Giant' and the late 'John Innes' cropped satisfactorily. 'Himalaya Giant' also produced a good sample of fruit, but the 'Young Berry' again proved too tender to withstand our cold winter.

CANNING TESTS.

As in former years, new varieties of Strawberries, Raspberries, Black Currants, Plums, and Gooseberries have been sent to the Fruit Preservation Research Station, Campden, to test their canning qualities. A report on these will be published later.

SUB-STATIONS.

The varieties of Apples and Plums, with the exception of the Canadian Apples, on extended trial have not been established suffi-

ciently long to enable records to be made of their cropping habit. Of the Canadian varieties 'Melba' is the only one reported to be giving satisfaction, thus confirming the promise shown at the central station. At Worcester it is stated to be particularly suitable for growing as a cordon.

Crops of Black Currants in Norfolk and Durham were so badly affected by frost that no reliable crop records could be obtained. In Worcester and Wisbech the frost did not affect the crop. 'Davison's Eight' and 'Black Tony' gave the heaviest yield at Worcester sub-station, and 'Wallace's Seedling' at Wisbech.

Of the Red Currants on trial at the sub-stations, 'Laxton's No. 1' has in every instance given the heaviest yield. 'Wilson's Long Bunch' is reported as having been the second heaviest cropper in 1936, but 'Earliest of Fourlands' has not proved so satisfactory at the sub-stations as at the central station.

At Emneth and Wisbech the heaviest cropping Raspberry this year was 'Matchless.' The varieties yielding best in Worcester were 'Red Cross' and 'Norfolk Giant,' while Durham reported 'Reward' as being the best.

Among Gooseberries the variety 'Green Gem' has been outstanding. Every station has reported highest yields from this variety, and districts which experienced frost, notably Durham and Emneth, report this variety's resistance to frost, as already observed at the central station.

* * * * *

It may be of interest to record that all kinds of fruit, with the exception of Raspberries, Strawberries and Nuts, were sprayed in winter with a tar distillate wash. Apples and Pears received two pre-blossom sprays and one post-blossom spray with lime-sulphur. The pre-blossom sprays were applied at 1/30 and 1/60 strengths respectively, and the post-blossom spray at 1/100; certain varieties such as 'St. Cecilia' were not given this latter spray as they are sulphur shy. Isolated outbreaks of insect pests were controlled by spraying with lead arsenate or Derris. Black Currants were sprayed in April with lime-sulphur 1/15 strength to control big-bud mite. Plums were sprayed with lime-sulphur, 1/100 after flowering, for Red Spider. This routine spraying resulted in the orchards being maintained in a satisfactory state of cleanliness and freedom from fungus attack.

THE PROBLEM OF THE BLUE HYDRANGEA.*

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I. HISTORICAL AND HORTICULTURAL ASPECTS.

ALTHOUGH Hydrangeas have been cultivated for centuries in China and Japan, no early records are available concerning their well-known flower † colour changes in these countries. According to CURTIS ¹¹ ‡ they were introduced to England from China by Sir JOSEPH BANKS, in 1790. It is probable that very soon after this, plants began to exhibit the pink or red to blue change in their flowers, for to quote CURTIS: "a plant which has produced red flowers one year shall produce blue another, though growing in the same pot; this we saw happen in the year 1796 . . ."

The date of the first attempt to control the colours is uncertain, but it was doubtless after CURTIS described the phenomenon in 1799, as he did not associate it with any cultural variations. The earliest endeavour to promote blueness in pink flowers could not have been made until the possible importance of soil conditions was recognized. The subsequent addition of diverse substances to the soils in which Hydrangeas were grown must have commenced between 1800 and 1815, since NEILL ¹⁸ editing the Journal of a Horticultural Tour through some parts of Flanders, Holland, and the North of France in the Autumn of 1817, mentioned the use of turf ashes or the ash of Norway spruce in the production of blue-flowering plants. At about the same time SPRENGEL ³¹ was said to have found that iron salts changed the colour of red flowers to blue.

A few years later a major discovery was made, in that alum was found effective in bringing about the red or pink to blue change. In a letter to the Secretary of the Horticultural Society of London, dated 2nd April, 1821, J. BUSCH, ⁶ gardener to the Emperor of Russia at St. Petersburg, writes his observations:—

"*Hydrangea hortensis* will be turned blue by watering the young plant the summer before with allum water. Our gray coloured earth under the black moor earth will have the same effect, being combined with aluminous salt."

According to FINTELMANN ¹⁴ no fixed method for the production

* *Hydrangea macrophylla* D.C., syn. *H. hortensis* Smith, *H. Hortensia* Sieb., *H. opuloides* Koch., and varieties; *H. serrata* D.C. and varieties.

† The conspicuous coloured portions of the flowers are the petaloid sepals and pedicels.

‡ Numbers refer to articles listed at the end of the paper.

of blue Hydrangeas was in use in Prussia at the time, but he recommended very old leaf soil for the purpose.

Amongst other directions for changing the colour of Hydrangeas, LOUDON¹⁵ in 1834 cited: one tablespoonful of alum to as much soil as will fill a 7-inch by 10-inch pot, also soil impregnated with oxide of iron. As indicated here and in previous works (1822 and 1825), LOUDON relied upon the yellow loam of Hampstead Heath to accomplish satisfactory bluing of the pink flowers.

The first cultural experiments systematically performed were those recorded by DONALD¹² in 1846. He tested the following substances on plants grown in 6-inch pots: $\frac{1}{2}$ oz., and $\frac{3}{4}$ oz. phosphate of iron, $\frac{1}{2}$ oz. sulphate of iron, $\frac{1}{2}$ oz. alum, $\frac{1}{2}$ oz. caustic potash and $\frac{1}{2}$ oz. phosphate of magnesia. Blue flowers appeared only on the plant treated with alum.

It was not until 1892 that the production of blue Hydrangeas was studied by a plant physiologist. In that year MOLISCH¹⁶ initiated an extensive series of experiments in which 400 plants were examined before its completion in 1896. His results may be summarized as follows:—

The soil in which Hydrangeas always flowered pink gave blue flowers only when aluminium sulphate or potash alum was applied. Pink flowers with blue filaments were sometimes obtained by the alum treatment and where aluminium sulphate was used the leaves often became brown (this was probably due to the excessive amount used, viz. 100 c.c. of crystals to a 15–20 cm. pot). Ferrous sulphate produced pink, mauve, or pale blue flowers, but in most cases the leaves turned brown and dropped. Iron applied in the form of filings, turnings, rust or nails did not yield any blue flowers even when used in large quantities (500 g. to a pot).

Powdered slate and peat caused the filaments to change to blue but the petaloid sepals remained unaffected.

Alumina, ammonium sulphate, charcoal, emery powder, powdered sulphur, potassium sulphate, soda, tinfoil, and zinc had no influence on the pink sepals, while the sulphates of cobalt, copper, manganese, and zinc proved deleterious to the plants.

In order to obviate the injurious effect of the excessive treatment with aluminium sulphate which frequently occurred in MOLISCH's experiments, VOUK²² carried out further experiments to determine the amount of alum or aluminium sulphate sufficient to bring about the blue colour without harmfully affecting the plant. Preliminary trials showed that iron compounds, in order to produce blue flowers had to be applied in such large quantities that the plants suffered severely. Plants potted in soil that normally gave red flowers were watered throughout the growing period, from the times the bud appeared until flowering, with 0.5 per cent., 1 per cent., and 3 per cent. solutions of potash alum and aluminium sulphate respectively. After conducting the experiments over two flowering seasons VOUK concluded that potash alum caused a more intense change from red to blue than

aluminium sulphate, the plants being quite uninjured, and that a 1 per cent. solution of the former was the most satisfactory of the three dilutions tested.

Later, in 1922, MOLISCH¹⁷ modified his method and recommended the following procedure for producing good blue-flowered Hydrangeas :

The small plants are transplanted into the flowering pots in August, at which time they are treated with alum. A medium-sized spoonful of alum crystals is spread over a thin layer of soil contained in a 15 to 20 cm. crocked pot. The ball of roots is then placed in position and the space between the ball and the pot filled with a mixture of soil and alum (100 c.c. of pea-sized alum crystals to a pot). The plants are allowed to rest in a cold frame until the following January when they are brought into a warm greenhouse for forcing. Blue and violet flowers are produced in April without further addition of alum.

Owing to the uncertainty of colour control in Hydrangeas amongst American horticulturists, CONNORS^{8, 9} commenced cultural experiments in 1921 which were continued until 1927. From his results he concluded that the application of about 2 lb. of ground chalk to the square yard was required to convert blue flowers into pink and that 1 lb. of aluminium sulphate to the square yard would produce the reverse effect.

COVILLE¹⁰ found that one part by bulk of aluminium sulphate to two hundred parts of rich garden soil was sufficient to change the colour of pink Hydrangeas to blue.

Despite its popularity in France, very few records have been made of experiments on the production of blue-flowered Hydrangeas. This is possibly due to the general use of soil from the neighbourhood of Angers, which is distributed all over the country for this purpose. CHOUARD⁶ in 1933, experimenting with aluminium, iron, and chromium sulphates, claimed that blueness of an intensity greater than when the other sulphates were used, could be induced by chromium. The next year⁷ he examined the influence of sulphates of cobalt, copper, manganese, and uranium. The most remarkable result obtained was in the case of uranium sulphate which, he asserted, gave blue-flowered plants with very deep-green leaves.

The usual French practices for obtaining blue Hydrangeas are described in a recent booklet by EBEL.¹⁸ Potting the plants in strongly "ferruginous" soil from Angers is usually adopted to give the best blue flowers. Powdered slate in the proportion of half or one-third of the soil is said to produce mauve flowers, but blue ones can be obtained subsequently on watering with weak alum or ferrous sulphate solutions.

The investigations on the colour control of Hydrangeas undertaken by ALLEN³ were made in order to provide American growers with a reliable method for bluing the pink flowers. Plants were potted (6-inch pots) in an alkaline clay loam and the effects of various acidifying agents on the colour were examined. The following solutions were applied at weekly intervals for nine weeks, at the rate of

about 250 c.c. per pot : 2.5 per cent. aluminium sulphate, 2.5 per cent. potash alum, 1 per cent. ferrous sulphate, 1 per cent. copper sulphate, 1 per cent. sulphuric acid, 1 per cent. citric acid, 1 per cent. hydrochloric acid and 1 per cent. acetic acid. Complete changes to blue took place only when the 2.5 per cent. aluminium sulphate was employed. Potash alum produced pinkish flowers, while ferrous sulphate gave bluish pink ones. In a subsequent series of experiments it was found that five applications of the 2.5 per cent. aluminium sulphate were sufficient to produce blue flowers without injury to the plants.

Despite the preceding directions and those invariably found in gardening and shrub books where the cultivation of Hydrangeas is described, considerable doubt exists regarding the most reliable method to use, as is seen in the large number of undesirable, dull, purplish-pink flowering plants offered for sale every spring. This is partly due to the inaccessibility of the literature, the unsatisfactory directions given in horticultural works (the quantities of aluminium salts advised are usually much too small), the possible reticence of successful growers, and partly to the reliance of English nurserymen on the so-called "Blue-prepared" plants imported from Holland and Belgium.

Experimental.—In order to find a method that was both effective and simple in application it was considered necessary to examine those recommended by other workers with a view to improvement.

The revised technique of MOLISCH is almost certain to give good results but is rather uneconomical in practice, about $\frac{1}{4}$ lb. of alum being used for each 8- or 6-inch pot.

In the present research the simplest method examined for applying the aluminium salts was to add suitable quantities in a coarsely ground state to the plants after their final potting. Powdered alum or aluminium sulphate spread over the surface of the soil at the rate of $1\frac{1}{4}$ oz. to a 6-inch pot during the resting period produced good blue flowers the following spring. When this quantity of alum or aluminium sulphate was given to the plants a month before they were due to flower, effective bluing took place, but with considerable yellowing and dropping of the leaves. In some plants incipient blueness appeared in the sterile flowers only five days after the application of alum, these flowers being on the point of developing their pink colour.

In no instance was a plant killed by excessive aluminium treatment, and, although severe defoliation often occurred, the lateral buds and stems were unaffected. Furthermore, the leaves of plants prepared to produce blue flowers, by the addition of aluminium salts very early in the season were not injured, and remained on the stems throughout the growing period.

The following procedure was finally adopted for the bluing of Hydrangea flowers, from the results of experiments on 200 plants : The rooted cuttings, taken from the propagating bed in August or early in September, were potted in 5-inch "48" or 6-inch "32" pots with a soil consisting of three parts rich cucumber loam (lime free),

plus one part leaf mould (oak). The surface of the soil was covered with coarsely ground crystals of aluminium sulphate at the rate of about $\frac{3}{4}$ oz. and $1\frac{1}{4}$ oz. to a pot respectively. This application (approximately 1 to $42\frac{1}{2}$) is equivalent to about $2\frac{1}{2}$ lb. of crystals per cwt. of the soil mixture. When large numbers of plants are dealt with, potting in soil already containing the aluminium sulphate would be more practicable. The plants were kept in a cold frame or greenhouse until the following January when they were forced for early flowering by transferring them to a warmer house.

Experiments on outdoor Hydrangea plants.—Four large eight-year-old pink-flowering plants growing in a neutral sandy loam were treated at the bases of the stem clusters with $\frac{3}{4}$ lb. aluminium sulphate in February, and four plants with $\frac{3}{4}$ lb. of potash alum. On flowering in July the plants to which aluminium sulphate only had been applied gave two or three pure blue heads out of a total of over 100 heads per plant. The alum-treated plants showed signs of bluing in a few flowers only, but no completely blue ones occurred. The failure to produce a uniform effect may be attributed to the extensive root systems of the plants and the small amounts of aluminium salts used.

If bluing is to be really complete in large outdoor Hydrangeas, quantities of aluminium sulphate, proportional to those recommended for potted plants are probably necessary. Assuming that a 6-inch pot holds 4 lb. of soil, one cubic yard of which weighs a ton, the application of aluminium sulphate sufficient to assure blueness in all the flower heads of a large plant with roots extending through a volume of 12 cubic feet, should be $23\frac{1}{2}$ lb. ($42\frac{1}{2}$: 1 basis) instead of $\frac{3}{4}$ lb. Owing to the intense leaching that is likely to take place in the soils of potted plants, smaller initial applications of 10 lb. a plant were tested on similar large clumps, early in April. This treatment proved very successful, yielding good blue flowers, but in order to preclude the tendency to young leaf damage it is advisable that the crystals should be spread round the clumps in November.

In order to improve the colour of the dull mauve or irregularly tinted blue flowers on plants growing in slightly acid soils, it is suggested that annual applications of 1 to 2 lb. of aluminium sulphate to a plant should be made until the colour change is complete.

The above directions may be followed with safety when dealing with established plants 3 to 4 feet high, comprised of clusters of 40 to 50 stems. Smaller Hydrangea clumps should be given lighter treatment ; about $\frac{1}{2}$ lb. of crystals to a stem may be taken as a rough guide.

II. SOIL CONSIDERATIONS.

No horticulturist who has grown Hydrangeas can have failed to speculate as to the reason for their capricious flower colouring. Some of the earlier ideas are recorded by LOUDON in his *Encyclopædia of Gardening*, of 1822. Under *Hydrangea hortensis* he states :—

“ Soon after it was introduced some plants were found with blue flowers, which were supposed to be produced by salt or saltpetre and

others by oxide of iron. The yellow loam of Hampstead Heath and some other places and some sorts of peat earth are found to produce this effect; but the cause is not yet ascertained."

In 1821, SCHÜBLER²⁸ analysed soil in which Hydrangeas flowered blue and showed that no greater iron content occurred than in ordinary garden soil. He ascribed the bluing capacity of some soils to their greater carbon and humus content and asserted that these substances absorb oxygen in the soil, thereby depriving the roots, causing "de-oxidation," which changed the pink colour to blue.

After his discovery of the use of alum in the cultivation of blue Hydrangeas, BUSCH naturally assumed that soils also having bluing properties, contained aluminium salts. This possibility appears to have been overlooked, for it was not until over a hundred years later that similar assumptions regarding these soils were recorded.^{2, 21}

FINTELMANN¹⁴ believed that the cause of the colour change was unknown, but observed that natural soils which "accidentally" gave blue Hydrangeas contained a "good deal of oxide of iron." However, the early analyses of SCHÜBLER were repeated and confirmed by SCHÜBLER and LACHENMEYER²⁹ in 1834, who also discussed the use of iron oxide, iron sulphate, humus, and alum as bluing agents for red Hydrangeas in terms of the "deoxidation" theory.

The opinion prevalent in France at about this time concerning the blue Hydrangea was that its colour was due to iron. SIEBOLD and ZUCCARINI,³⁰ after describing the invariable blueness of Hydrangea flowers in Japan, stated that their colour proved that ferruginous substances were present in the soil.

From his extensive cultural experiments MOLISCH¹⁶ concluded that either alum, aluminium sulphate or ferrous sulphate (tacitly, when applied to the soil) would bring about the red to blue colour change in Hydrangea flowers.

The views of English horticulturists on soils from which blue Hydrangeas can be produced are recorded by BEAN⁴ and OSBORN.¹⁹ While admitting that no satisfactory explanation of the colour change can be offered, BEAN states that blueness is "almost certainly" due to the presence of ferruginous substances in the soil. OSBORN asserts also that the blue colour of Hydrangeas is due to the presence of iron in the soil. Both authors mention the use of alum in this connexion. Apparently the same views on the subject are held in France, according to EBEL.¹³

It was not until about 1922 that soil acidity was studied as a factor concerned with the colour changes of Hydrangeas. ATKINS³ noticed that pink Hydrangeas grew in alkaline soil and blue in acid. He found that plants from soils of pH 5.75 and pH 6.0 produced blue flowers, soils of pH 5.9, 6.2 and 7.3, pink, intermediate or blue, and soils with a reaction of pH 7.5, 7.6 and 8.0 all pink flowers. ATKINS concluded that the blue colour of Hydrangeas, resulting from the application of alum or aluminium sulphate to the soil was due to the increase in acidity and consequent liberation of iron.

Also at this time CONNORS⁸ ascertained the critical soil reaction at which the colour change commenced to be pH 6.2. Below this figure, blue flowers, and above, pink ones, were usually obtained. At the critical point the flowers were of an intermediate shade. CONNORS attributed the bluing of pink Hydrangeas to changes in soil acidity produced by the addition of iron and aluminium salts, rather than to the direct effect of these metals.

In a study of the influence of soil acidity on the growth of greenhouse plants WIGGIN and GOURLEY³³ examined *Hydrangea hortensis*. The reactions of the soils were maintained fairly constant by the addition of aluminium sulphate and measured with a quinhydrone electrode apparatus. The best growth of Hydrangeas occurred in soils of pH 4.0 to pH 6.0. The plants in soils of pH 4.0 to pH 5.0 invariably produced blue flowers which were occasionally obtained in the less acid soils of pH 5.0-6.0, where most of the flowers were pink. Soils of reaction between pH 6.0 and 7.0 gave slightly smaller plants which were always pink flowered.

RABER²¹ stated that the colour of blue Hydrangeas was produced when the soil contained soluble aluminium salts, but gave no analytical or experimental data to support this contention. He described the similar property of iron salts, but offered no reasons as to why iron should not have a rôle equal to that of aluminium.

Although ALLEN² assumed from injection and spraying experiments that available aluminium was the factor responsible for the bluing of pink Hydrangeas, he did not specify the meaning of "availability" nor record any soil and plant analyses.

Experimental.—The alcohol-displaced soil solution having been established by other workers in this laboratory and elsewhere as being the most probable medium from which plants obtain their mineral nutrients, was considered in the present research as a possible line of approach towards the solution of the blue Hydrangea problem. The chief points to be elucidated were: whether aluminium and/or iron occurred in the displaced solution from soils which naturally produce blue flowers and whether the liberation of iron took place on application of aluminium salts to neutral or only slightly acid soils as concluded by ATKINS.

The soils examined were taken either from the surface layer (top 9 inches) near the growing Hydrangea plants or from the experimental pots or trays, the solutions being displaced as soon as possible after sampling. The method of extraction employed was a modification of the alcohol displacement process described by PARKER.²⁰ The analyses were effected by the methods indicated in Part III, and the results expressed in parts per million of the soil solution, without correcting for variations in soil moisture content.

From the table it is disclosed that only in the solutions of the five most acid of the eight blue Hydrangea soils was aluminium, and in no case iron, detected directly. An appreciable quantity of iron is found only in the very acid Wisley soil solution of pH 4.0, possibly existing in the form of complex organic anions.

The results suggest, but do not prove, that free (ionic) aluminium in the soil solution is the factor responsible for the colour of naturally blue Hydrangeas.

TABLE I.
Analyses of Soil Solutions.

Source.	Al. p.p.m. Ionic.	Al. p.p.m. Total.	Fe. p.p.m. Total.	pH.
<i>Blue flowers.</i>				
Bagshot, Surrey	1.40	..	—	4.7
Blackhill, S. Wales	0.39	..	—	5.6
Grasmere, Westmorland	0.25	..	—	4.3
Newcastle, Co. Down	—	..	—	7.6
Trimley, Suffolk	0.11	—	0.07	6.1
Wimborne, Dorset	—	..	—	6.3
Wisley, Surrey	6.70	7.35	1.18	4.0
<i>Blue or Pink flowers.</i>				
Felixstowe, Suffolk	—	..	—	7.7
Kew, Surrey	—	..	—	7.4
<i>Pink flowers.</i>				
Dutch fen soil	—	0.2	0.2	6.7
Felixstowe pot soil	—	..	—	6.6
<i>Experimental Soils.</i>				
Dutch : Al treated (blue)	8.60	10.3	1.10	4.5
Felixstowe, plot $\text{Al}_2(\text{SO}_4)_3$ $\frac{1}{2}$ lb./sq.yd. . . .	—	0.014	0.015	6.1
Felixstowe, plot control	—	0.007	0.048	6.7
„ tray, $\text{Al}_2(\text{SO}_4)_3$ 20g/7 lbs. . . .	—	0.16	0.004	5.7
„ „ FeSO_4 17g/7 lbs. . . .	—	0.018	0.046	6.5

— Indicates concentrations of about 0.01 p.p.m.

The analyses of the solutions from the experimental soils illustrate the capacity of soil for almost complete absorption of large amounts of aluminium and iron salts, with little change in reaction. In the Dutch blue Hydrangea soil sufficient aluminium salts have been added to lower the pH to such an extent that a relatively large quantity of total iron appears in the soil solution. This is in accordance with ATKINS' conception, but it may be pointed out here that the concentration of aluminium is nearly ten times greater than that of iron, also no evidence is shown regarding the availability of this iron (it could not be detected directly).

A depression in the iron content of the solutions from Felixstowe soil occurred when they were treated with aluminium sulphate at the rate of $\frac{1}{2}$ lb. to the square yard.

Owing to the large number of factors involved in soil solution studies it cannot be concluded from the few results presented that either an increase or a decrease in iron concentration of the soil solution takes place on addition of aluminium salts to the soil.

From the pH values no definite reaction can be described as being the critical one for the colour change. This is almost certainly due to the fact that the soil samples were not representative of the total amount of soil in contact with the root system of the plants.

III. PLANT CONSIDERATIONS.

The evidence submitted in the preceding section and consideration of the fact that aluminium salts are almost invariably used by nursery-men to produce blue *Hydrangeas*, points to the probability that absorption of aluminium ions rather than ferrous or ferric ions by the plant must be the primary cause of the colour change.

A discovery made by MOLISCH¹⁶ appears rather disconcerting when applied to either the aluminium or the iron theories respectively. While he failed to obtain an extract of the pigment from *Hydrangea* flowers, MOLISCH was able to demonstrate that both aluminium sulphate (or alum) and ferrous sulphate changed the pink-coloured sections of the flower pedicels to blue. He maintained that the blue colour was due to the combination of the red anthocyanin and the inorganic iron or aluminium which naturally produce the effect in the flowers by absorption through the roots.

In an attempt to elucidate the problem ATKINS³ analysed red and blue *Hydrangea* flowers for iron. He found a higher concentration in the blue than in the red flowers and concluded that iron rather than aluminium was probably the metal that reacted with the red anthocyanin to give the blue colour. ATKINS was unable to explain the findings of MOLISCH on this basis and suggested later that aluminium was in part responsible for the blueness but that iron played a large, or possibly the main part.

ALLEN¹ advanced the study of the colour changes by hitherto untried methods. He sprayed mature pink flowers with solutions of H_2SO_4 , FeCl_3 , FeSO_4 , $\text{Al}_2(\text{SO}_4)_3$ and salts of K, Cu and Mg, and found that blueness developed in the sepals only when aluminium sulphate was used. Experiments on the absorption of salts through cut stems apparently confirmed these results, but as ALLEN only mentioned the intense blue colour produced by aluminium sulphate, and did not record the influence of iron salts in this connexion, it is possible that the latter were not without effect. He did not account for MOLISCH's observations on the formation of a blue compound between iron and the red anthocyanin nor yet the analytical data obtained by ATKINS.

In a survey of the distribution of aluminium in the plant world, YOSHII and JIMBO²⁴ found, qualitatively, that *Hydrangea* leaves contained relatively large amounts of this element. The colours of the flowers from the same plants were not recorded, but owing to the prevalence of acid soils in Japan they were almost certainly blue.

Contrary to the observations made by ALLEN, ROBINSON and ROBINSON²⁶ stated that when the stalks of red *Hydrangea* flowers were immersed in very dilute aqueous FeCl_3 , the flowers became blue. In a recent review of the chemistry of anthocyanins R. ROBINSON²⁷ suggests that: "the presence of iron in the cell sap might be responsible for blue colours. Recent analyses of blue and red *Hydrangeas* by MANLY have been interpreted in this sense, and although this popular

problem cannot be said to have been completely solved, the presence of iron must be reckoned with in considering the factors responsible for flower colours."

In view of the conflicting evidence as to the significance of iron and aluminium, it was considered desirable to study the problem of Hydrangea colour changes in the following unexplored fields of research:—

1. The extensive examination of the effect of metals on the anthocyanin.
2. The analysis of Hydrangea flowers of all colours grown under as many different conditions as possible.
3. The distribution of aluminium and iron throughout the Hydrangea plant.

In this manner it was hoped to prove whether aluminium or iron was the metal to the uptake of which the red to blue colour change should be attributed.

Experimental.—It is relevant to state at this juncture that the possibility of changes in cell-sap acidity accounting for the colour changes was precluded by the work of ATKINS and CONNORS. ATKINS tested pink and blue petaloid sepals from the same plant and found the reaction to be the same for both colours, viz. 4.0–4.2. CONNORS⁹ ascertained that sap pH of pink flowers grown on limed soil was 5.0–5.2, white flowers 4.4–4.6 and blue flowers 4.3–4.5.

As the above values were obtained by colorimetric methods, further confirmation seemed necessary. By means of the quinhydrone electrode set the following results were obtained:—

Variety.	pH.
La Marne pink	4.75
„ „ blue-violet	4.75
Nedersachsen, pale blue	4.4
Goliath, purple	4.3
Un-named, deep blue	4.3
Lorely, deep pink	4.5
Princess Juliana, white	5.3

In the event of the anthocyanin acting as an indicator the more acid saps should have given red or pink flowers, but this apparently is not the case.

The effect of metals on the anthocyanin of Hydrangea hortensis.—The chemical nature of the Hydrangea anthocyanin remained unknown until ROBINSON and ROBINSON²²⁻²⁵ commenced their survey of these compounds. In 1931 it was found that the pigment in red-flowered plants was a complex diglycoside of delphinidin; blue flowers also gave a delphinidin diglycoside. Further examination in 1932 showed the anthocyanin to be a pentose-glycoside of delphinidin. The leuco-anthocyanin of Hydrangeas was extracted in 1933 and proved unexpectedly to be of the cyanidin type. Flowers tested in 1934 appeared

to contain complex delphinidin diglycoside early in the season but later the complex character was not observed.

Since the anthocyanin present in red *Hydrangeas* is rapidly converted to a leuco-compound on exposure to air, both ATKINS and MOLISCH found it impossible to prepare an aqueous extract. In the present research the following very simple technique was adopted in order to examine the effect of metals: the red petaloid sepals were placed on a white tile, a few drops of the dilute metallic salt solution added and the sepals macerated with a spatula. In this way it was found that transient blue colours were given only by aluminium and iron salts. Alcoholic extracts of the sepals produced the same results, but the colours obtained with aluminium and iron salts were often coloured green through anthoxanthin contamination. A fairly pure sample of the pigment was extracted by warming the sepals with glacial acetic acid and precipitating the anthocyanin-acetate with ether. This precipitate was washed several times with ether, dissolved in water and tested with the various salt solutions. Cobalt, chromium, copper, manganese, nickel and uranium all gave negative results, but blue colorations were obtained with solutions of as little as one part per million of iron and aluminium. The iron coloration was of a greenish-blue tint, while that from aluminium was pure sky blue.

Sepals of pink *Hydrangeas* were next soaked over-night in dilute solutions of aluminium, ferric and ferrous sulphates and ferric chloride. The aluminium sulphate changed the colour to sky blue, but the iron solutions turned the sepals blue-black.

It proved impossible to keep the cut *Hydrangea* blooms alive more than two or three days, but when small portions of the pink flower heads were placed in solutions of aluminium and iron salts the metallic ion was absorbed in sufficient amounts to produce a colour change. Aluminium sulphate gave a bright greenish-blue tint to some of the petals and ferrous sulphate produced greenish-black coloration throughout. The same effects are induced by watering the plants with very strong solutions of these salts. It is possible that both the anthocyanin and any tanninoid substances present reacted with the iron to give the greenish-black colorations.

The above observations tend to confirm those of MOLISCH and ROBINSON, and appear to indicate that aluminium is likely to be of more importance than iron in the production of the pure sky blue of petaloid *Hydrangea* sepals. It is emphasized that further elucidation of the respective functions of aluminium and iron can be obtained only from analytical data.

The Analysis of Hydrangea Plants.—The cleaned samples were ashed in platinum crucibles, the ashes fused with sodium carbonate and then taken up with dilute acid. Aluminium and iron were determined in the acid extracts by means of "aluminon" and thiol-acetic acid respectively.

All results are expressed as parts per million (milligrams per kilo) of material dried at 105° C.

TABLE II.
Plants from different soils.

Source.	Material.	p.p.m. Al.	p.p.m. Fe.
(a) <i>Blue flowering.</i>			
Bagshot . . .	*Flowers . . .	957	32
	Leaves (old) . . .	4,200	350
Blackhill . . .	Sepals . . .	1,500	139
	Pedicels . . .	2,070	108
	Leaves . . .	5,840	191
(blue tinted) . . .	Sepals . . .	326	114
	Stamens, etc. . .	747	103
	Pedicels . . .	378	87
Grasmere . . .	Flowers . . .	2,710	241
	Leaves . . .	12,200	..
	Stems . . .	1,110	210
Newcastle . . .	Flowers . . .	990	191
	Leaves . . .	1,400	220
Trimley . . .	Flowers (old) . . .	1,340	..
	Flowers . . .	895	160
	Leaves . . .	1,650	204
	Stems . . .	383	128
Wimborne . . .	Flowers . . .	2,230	..
Wisley . . .	Flowers . . .	412	83
	Leaves (green) . . .	2,850	281
	Leaves (yellow) . . .	8,300	467
	Leaves (old) . . .	8,650	270
(b) <i>Pink flowering.</i>			
Felixstowe . . .	Flowers . . .	93	..
„ (potted) . . .	„ . . .	41	..
	„ . . .	24	98
	„ (red) . . .	29	114
	„ . . .	56	163
	„ (white) . . .	34	98
	Leaves (chlorotic) . . .	17	66

* Sterile flowers consisting of petaloid sepals, aborted stamens, and pedicel.

TABLE III.
Blue and pink flowering plants from same soil.

Source.	Material.	p.p.m. Al.	p.p.m. Fe.
Kew	Flowers (pink) . . .	50	113
	„ (blue) . . .	512	206
Felixstowe	Sepals (pink) . . .	109	143
	Pedicels „ . . .	..	135
	Sepals (blue) . . .	456	130
	Pedicels „ . . .	705	..
	Sepals (pink) . . .	96	..
	Pedicels „ . . .	70	90
	Sepals (blue) . . .	239	155
	Pedicels „ . . .	823	129

TABLE IV.
Plants treated with aluminium salts.

Source.	Material.	p.p.m. Al.	p.p.m. Fe.
Dutch, fen soil, potted plants	Flowers (blue) .	473	154
	Leaves .	1,070	251
	Flowers (pale blue)	496	220
Felixstowe, large outdoor plants	Flowers (pale blue)	695	373
	Flowers (deep blue)	852	355 { off
	Flowers (red) .	56	259 { same plant.

TABLE V.

	Aluminium treated.		Untreated.	
	p.p.m. Al.	p.p.m. Fe.	p.p.m. Al.	p.p.m. Fe.
Fibrous roots . . .	1230	317	72	55
Woody roots . . .	596	167	125	114
Rootstock . . .	682	185	21	74
Old brown stems . . .	494	179	26	91
Young „ „ . . .	220	149	52	84
Green stems . . .	432	205	..	..
Buds . . .	570	175	53	138
Old leaves . . .	1,160	270	114	187
Young leaves, February 3 .	761	326	28	217
„ „ March 31 .	2,180	208	72	143
Fully grown leaves, April 24	1,070	251	40	142
Green stems, April 24 .	267	182	24	60
Flowers . . .	473	154	34	98
Leaves, July 12 . . .	2,560	339	..	..

TABLE VI.
Mean values.

<i>Flowers and parts of flowers.</i>					<i>Blue.</i>	<i>Pink, red or white.</i>
Aluminium .	p.p.m.	.	.	.	943 (21)	59.9 (11)
Iron .	„	.	.	.	166 (18)	135 (9)
<u>Aluminium</u>		.	.	.	5.68	0.445
Iron		.	.	.		
<i>Leaves.</i>						
Aluminium .	p.p.m.	.	.	.	2,434 (14)	60.2 (5)
Iron .	„	.	.	.	281 (12)	151 (5)
<u>Aluminium</u>		.	.	.	8.65	0.398
Iron		.	.	.		
<u>Aluminium in Blue Flowers</u>						
<u>Aluminium in Pink, etc.</u>					= 15.7	
<u>Iron in Blue Flowers</u>						
<u>Iron in Pink, etc.</u>					= 1.23	
<u>Aluminium in "Blue" Leaves</u>						
<u>Aluminium in "Pink," etc.</u>					= 40.6	
<u>Iron in "Blue" Leaves</u>						
<u>Iron in "Pink," etc.</u>					= 1.87 .	

The numbers in brackets refer to analyses available.

Discussion of Results.—It is most apparent, even on first inspection of the Tables, that in every instance the aluminium content of the blue flowers is greater than that of the red or pink. The average value of 21 analyses of blue sterile flowers, petaloid sepals and pedicels is 943 p.p.m. of aluminium, while the mean of 11 analyses of red, pink, and white flowers is only 59.9 p.p.m. of aluminium. The highest aluminium concentration found in flowers from Grasmere is 110 times greater than that for the pink flowers grown in a pot, which have the lowest aluminium concentration. The lowest aluminium content in the blue flowers is considerably larger than the highest value obtained for pink flowers.

Considered as a whole the iron determinations show a greater concentration in the blue than in the pink, red or white flowers, the former being 1.23 times higher. This confirms the results of ATKINS and MANLY, but the average aluminium:iron ratio for the blue flowers is 12.8 times the ratio for the red flowers. In six instances the iron content of the blue is below the mean iron concentration in the red flowers.

The significance of aluminium appears even more striking when the analytical results for the *Hydrangea* leaves are considered. Here the average aluminium:iron ratio of the blue-flowered plants is 21.7 times greater than that of the red- or pink-flowered plants, while the highest aluminium content, again occurring in the Grasmere plant, is 700 times larger than the lowest content recorded for the chlorotic leaves of a pot-grown pink-flowered plant.

In every instance higher concentrations of both aluminium and iron exist in the leaves than in the flowers.

The flowers obtained from Blackhill, South Wales, exhibit a very interesting correlation between aluminium content and degree of blueness. The deep blue flowers, although growing in the same soil, have a higher aluminium content than the white petaloid sepals that are only just tinted blue at the margins. The blue "eyes" (aborted stamens) of the white sterile flowers when analysed separately gave nearly double the quantity of aluminium in the white sepals.

Some very marked relationships are revealed when the data from the petaloid sepals are compared with those from the respective pedicels. For convenience the figures are rearranged below:

Sepal	} Al	1,500	456	239	160	{ all blue flowers.
Pedicel		2,070	705	823	280	
Sepal	} Al	143	76	{ both pink	326	{ white, tinted blue.
Pedicel		135	70		378	
Sepal	} Fe	139	114	199	143	{ blue and pink.
Pedicel		108	87	148	135	

Average ratios of $\frac{\text{Pedicel}}{\text{Sepal}}$

Aluminium: Blue = 1.57. Pink and White = 0.85. Iron: 0.84.

The aluminium ratios substantiate previous evidence regarding the relation between degree of blueness and aluminium content, for the pedicels of the blue flowers are almost invariably of a more intense colour than the corresponding petaloid sepals.

The iron ratio explains the greater significance of aluminium in the formation of the blue pigment, this being quite unconnected with the colour of the flowers.

Examination of parti-coloured Flowers.—Incipient blueness often appears in only one side of the Hydrangea flower head and the differences in colour are frequently maintained throughout the flowering period. This phenomenon is likely to occur in old pink-flowering plants.

The parti-coloured flower heads are usually about half purplish-blue and half pink rather than pure blue and pink. The differences in colour persist in the pedicels down to the common stem.

This series of analyses was performed in order to corroborate previous results and to ascertain the minimum concentration of aluminium (rather than iron) necessary to induce a colour change.

The blue or purple portions of the flower heads without exception contained more aluminium than their respective pink portions.

An unexpected and striking fact was brought to light in the iron analyses. In six instances the iron concentrations in the pink flowers were greater than in the blue and equal in the remaining one.

The minimum quantity of aluminium necessary to promote a colour change was found to be about 170 p.p.m. or 110 p.p.m. above the average concentration in pink flowers. On the fresh matter basis these values are equivalent to 21.6 p.p.m. and 14.0 p.p.m. respectively.

TABLE VII.

All figures in the same line refer to the same flower head.

Material.	Aluminium.				Iron.		
	p.p.m. Blue	p.p.m. Pink	Blue Pink	p.p.m. Blue -Pink	p.p.m. Blue	p.p.m. Pink	Blue Pink
F	254	102	2.49	152	122	234	0.52
F	299	145	2.06	154	166	171	0.97
F	283	237	1.20	46	140	167	0.84
S	203	100	2.03	103	152	255	0.60
S	170	110	1.55	60	50	110	0.45
F	270	118	2.29	152	166	210	0.79
F	405	165	2.46	240	199	199	1.0

F = Sterile flowers, including pedicels.

S = Petaloid sepals.

The Distribution of Aluminium, etc., in the Hydrangea Plant.—The results were obtained from four plants grown in Dutch-fen soil treated with aluminium salts the preceding summer and four plants grown in

the untreated fen soil. Plants treated similarly to those examined produced pure deep blue flowers and the untreated plants from the same batch flowered pink or white.

From the data presented in Table VII it is indicated that the absorption of aluminium and iron takes place throughout the growing period, being stored in the leaves rather than in roots or root-stocks. The fact that aluminium is stored up in the leaves to a much greater extent than iron is of importance when the blue to pink colour change is considered. Blue Hydrangeas at leaf fall will lose, therefore, a larger amount of aluminium than iron, and unless this is more or less replaced during the subsequent season the plant will flower mauve or pink. When blue Hydrangeas are planted in neutral or alkaline soils the change to pink flowers is usually complete within two years.

Summary.—An attempt has been made to settle the controversial point as to whether aluminium or iron is the metal responsible for the colour changes in Hydrangea flowers.

The historical and horticultural aspects of the problem seem to suggest that aluminium in the soil is more likely to give rise to blue flowers than iron.

The analytical data presented with the soil considerations indicate the occurrence of aluminium ions in great excess of those of iron in the displaced solutions from soils that naturally yield blue Hydrangeas.

The anthocyanin extracted from pink Hydrangeas produces blue colorations equally well with both aluminium and iron, but the aluminium colour is more comparable with the actual blue flowers.

The analyses of pink and blue flowers convincingly demonstrate the greater significance of aluminium, final confirmation being furnished by the values for parti-coloured flower heads.

It may be concluded that the change in colour of pink or red Hydrangea flowers to blue is the result of absorption of aluminium, probably as ions from the soil solution, followed by the formation within the flower tissue of a blue-coloured aluminium-delphinidin complex.

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REFERENCES.

1. ALLEN, R. C. "Factors influencing the color of hydrangeas." *Proc. Amer. Soc. Hort. Sci.*, **28**, 410 (1931).
2. — "Controlling the color of greenhouse hydrangeas (*H. macrophylla*) by soil treatment with aluminium sulphate and other materials." *Proc. Amer. Soc. Hort. Sci.*, **32**, 632 (1934).
3. ATKINS, W. R. G. "The hydrogen ion concentration of the soil in relation to the flower colour of *Hydrangea hortensis* W., and the availability of iron." *Sci. Proc., Roy. Dublin Soc.*, **17**, N.S., 201 (1923).
4. BEAN, W. T. "Trees and Shrubs hardy in the British Isles." **1**, 626 (1924).
5. BUSCH, J. *Trans. Hort. Soc. Lond.*, **4**, 568 (1822).

6. CHOUARD, P. "Experiences preliminaires sur le bleuissement et la chlorose des Hortensias." Bull. Mens. Soc. Nat. Hort. France, 5 Ser. 6, 289 (1933).
7. — "Le bleuissement et la chlorose des Hortensias." *Ibid.*, 7, 229 (1934).
8. CONNORS, C. H. "Color control in forcing hydrangeas." Proc. Amer. Soc. Hort. Sci., 20, 282 (1923).
9. — New Jersey Expt. Stat. Ann. Rep. (1923), (1924), (1925), (1926), (1927).
10. COVILLE, F. V. "The effect of aluminium sulphate on Rhododendrons and other acid soil plants." Ann. Rep. Smiths. Inst., 369 (1926).
11. CURTIS, W. *Hydrangea Hortensis*, t. 438, Bot. Mag., 18, (1799).
12. DONALD, J., J. Hort. Soc. 1, 160 (1846).
13. EBEL, M. "Hydrangea et Hortensia," Bailliere, Paris (1934).
14. FINTELMANN, M. G. A. Loud. Gard. Mag., 5, 273 (1829).
15. LOUDON, J. C. "Encyclopædia of Gardening." Ed. 1, p. 990 (1822); Ed. 3 (1825), (1834); 1064 (1878).
16. MOLISCH, H. "Der Einfluss des Bodens auf die Blütenfarbe der Hortensien." Bot. Zeit., 55, 49 (1899).
17. — "Pflanzenphysiologie als Theorie der Gärtnerei." 5th Auf. Jena (1922), p. 13.
18. NEILL, P. "Journal of a horticultural tour through some parts of Flanders, Holland, and the North of France in the autumn of 1817." 23rd Aug. 1817, p. 122 (1823).
19. OSBORN, A. "Shrubs and Trees for the Garden," 375 (1933).
20. PARKER, F. W. Soil Sci., 12, 209, (1921).
21. RABER, O. "Principles of Plant Physiology." New York, 106 (1933).
22. ROBINSON, G. M., and ROBINSON, R. "A survey of anthocyanins, Part I." Biochem. J., 25, 1695 (1931).
23. — — Part II. Biochem. J., 26, 1650 (1932).
24. — — Part III. " 27, 206 (1933).
25. — — Part IV. " 28, 1712 (1934).
26. — — Nature, 132, 625 (1933).
27. — — June, (1935).
28. SCHÜBLER, G. "Untersuchung einer Erde, welche die Eigenschaft hatte, die gewöhnlich rothblühende Hortensia speciosa blau zu färben." Schweigger's und Meinecke's. Jahrb. d. Chemie u. Physik, 286 (1821). (Original not seen).
29. SCHÜBLER, G. and LACHENMEYER, C. "Untersuchungen über die Farbenveränderungen der Blüten." J. Prakt. Chem., 1, 46 (1834).
30. SIEBOLD, F. R. de, and ZUCCARINI, J. G. Flora Japonica, 1, 106 (1835).
31. SPRENGEL, K. P. J. "Anleitung zur Kenntniss der Gewächse, Halle, bei C. A. Kümmel." Thiel I, 231 (1817). (Cited by Allen 1931).
32. VOUK, V. "Einige Versuche über den Einfluss von Aluminium-salzen auf die Blütenfärbung." Oest. Bot. Zs. Wien, 58, 236 (1908).
33. WIGGIN, W. W. and GOURLEY, J. H. "Studies on the reaction of greenhouse soils to the growth of plants." Ohio Agric. Expt. Stat., Bull. 484 (1931).
34. YOSHII, Y., u. JIMBO, J. "Mikrochemischer Nachweis von Aluminium und sein Vorkommen im Pflanzenreiche." Sci. Rep. Tohoku, Imp. Uni., Ser. iv, 7, 65 (1932).

PLANTS TO WHICH AWARDS HAVE BEEN MADE IN 1937.

Begonia 'R. R. Anderson.' A.M. May 25, 1937. From Messrs. Blackmore & Langdon, Bath. A magnificent tuberous-rooted variety with large double scarlet flowers of good form. The largest blooms measure $5\frac{1}{2}$ inches across.

Calceolaria plecta. A.M. May 4, 1937. From the Director, John Innes Horticultural Institution, Merton. A very handsome plant for pot culture in the cool greenhouse. The ovate, coarsely toothed leaves are 6 to 8 inches long, and form basal clusters from which arise slender flowering stems 2 feet high. The lightly-branched terminal inflorescences carry a large number of light, rosy-mauve, crimson-spotted flowers of medium size.

Campanula betulaefolia. A.M. May 25, 1937. From Stuart Boothman, Esq., Nightingale Nursery, nr. Maidenhead. This species from the Caucasus and Asia Minor is most suited to a crevice in the rock garden or dry wall, where its cushion-like habit may develop. The many large pale pink bells are produced in branching cymes, each one an inch in length and width, the pointed petals cut to about one-third of the flower's length. The leaves have a long winged petiole, are ovate, acute, and coarsely toothed.

Campanula rupicola, Giuseppe's variety. A.M. May 25, 1937. From Dr. Giuseppe, "Trevoze," Felixstowe. This Grecian plant of prostrate habit bearing softly hairy spatulate foliage is usually monocarpic, but the present variety is said to be perennial. The rich mauve flowers appear singly in the leaf axils of the trailing stems, and are freely produced. They are upturned, each $1\frac{1}{4}$ inch deep, but scarcely as wide. Most apt for the alpine house.

Carnation 'Cella.' A.M. April 27, 1937. For market, shown by Messrs. C. Engelmann, Saffron Walden, Essex. A perpetual-flowering variety. Plant of robust, sturdy growth. Flower stems long, rigid. Flowers large, of good form and substance, with a full centre, margins of the petals slightly cut, of a soft salmon-pink shade; calyx strong. Somewhat scented.

Chrysanthemum Catananche. A.M. May 4, 1937. From Mrs. R. Lukin, Burghfield Common, Berks, and Dr. R. Seligman, Wimbledon Common, S.W. 19. A neat-habited Daisy from the Great Atlas Mountains, collected at 6,000 feet, with linear grey leaves divided at the tips into several segments; the flowers, borne upright on 4-inch stalks, are cream-coloured with a variable ring of red in the eye and some of the same tint outside the petals. A species for the alpine house.

Corydalis tomentella. A.M. May 4, 1937. From the Director, R.H.S. Gardens, Wisley. This Chinese species, in appearance much like *C. Wilsonii*, but differing in the presence of hairs, was introduced

to Europe by M. de VILMORIN in 1894 from Yunnan. The glaucous, twice-pinnate leaves lie flat on the ground surrounding the several 4- to 5-inch racemes which arise from the centre of the rosette. The individual flowers are rich yellow and have a blunt spur.

Cypripedium speciosum, Siberian form. A.M. May 25, 1937. From Lt.-Col. C. H. Grey, D.S.O., Cranbrook. A decorative hardy terrestrial Orchid. The erect stem reaches a height of 1 foot and bears 4 broadly ovate, plaited, light-green leaves, of which the largest is 7 inches long, and a solitary terminal flower. This is of large size, uniform purplish crimson in colour, and remarkable for the immense inflated labellum.

Daphne × Burkwoodii var. 'Somerset.' A.M. May 25, 1937. From Messrs. J. Scott, Merriott, Somerset. A hybrid raised from the cross *D. caucasica* × *D. Cneorum*. A sparingly branched shrub, at present about 18 inches high, with oblanceolate leaves 1 inch long. The fragrant blush-pink tubular flowers are flushed externally with rose, and are carried in bunches of 6 on short, leafy, lateral shoots.

Fritillaria glauca. A.M. May 4, 1937. From Lt.-Col. C. H. Grey, D.S.O. Described as recently as 1923 from Oregon; this is most suited to cultivation in a pan on account of its low stature. A pair of broad glaucous leaves is situated at the base of the 2- or 3-inch stem, and below the solitary, open, bell-shaped flower is a narrow bract. The flowers are a somewhat greenish-yellow tint, lightly mottled, reddish within, and occasionally on the reverse of the petals.

Fritillaria Purdyl. A.M. May 4, 1937. From Lt.-Col. C. H. Grey, D.S.O. A distinct and attractive Californian species allied to *F. biflora*, having broad and glaucous foliage. The flowers are produced usually one or two on each stem about 4 inches high, and may be almost horizontal or a little nodding in pose; they are curiously speckled with purple-brown on an almost white base, and outside have a green and varnished appearance.

Gaultheria Forrestit. A.M. May 4, 1937. From G. Johnstone, Esq., Trewithen, Gwinear Road, Cornwall. A choice evergreen shrub, hardy in mild districts. The arching growths bear narrow-elliptical, acuminate, lustrous green leaves 3 to 4 inches long and of leathery texture. The small globular pure white flowers are carried in dense axillary racemes 2 to 3 inches long, the pedicels, rachis, peduncles, etc., all being white.

Laeliocattleya × 'Alma' var. 'Coronation.' A.M. May 25, 1937. Of medium size, the chief attraction is the beautiful bright gold of the sepals and petals. The labellum is light ruby with venation of dull gold. The result of crossing *L.-c.* × 'Appam' with *L.-c.* 'Helius.' Staged by Messrs. Armstrong & Brown, Tunbridge Wells.

Leptospermum scoparium roseum. F.C.G. May 25, 1937. From the Rev. Canon A. T. Boscawen, Ludgvan Rectory, Cornwall. This very desirable variety received the A.M. on February 14, 1928. The sturdy, freely-branched growths are well clothed with small lanceolate leaves and bear many rose-pink, maroon-centred flowers nearly an inch in diameter.

Lilium Davidi var. 'Oriole.' A.M. May 25, 1937. From Messrs. W. A. Constable, Southborough. The young plant of this variety exhibited had a slender stem about 3 feet high, bearing the typical narrow leaves of the type and a lax terminal raceme of 7 orange-yellow, chocolate-spotted flowers.

Lilium × 'Lyla McCann.' A.M. May 25, 1937. From Messrs. W. A. Constable. The parents of this new hybrid Lily are *L. Willmottiae* and a form of *L. dauricum*. The specimen exhibited was 2½ feet high, with a densely leafy stem, and bore 7 flowers in a short raceme. The flower is 4½ inches across, and has slightly reflexed, spotted orange segments. Raised by Miss Preston, Central Experiment Farm, Ottawa.

Meconopsis × **Sheldonii**. A.M. May 25, 1937. From W. G. Sheldon, Esq., Oxted. A very beautiful hybrid raised by the exhibitor from the Nepal form of *M. grandis* crossed with *M. betonicifolia*. The plant is about 3 feet high, sparingly branched, with long-stalked narrow leaves and 3 or 4 clear sky-blue flowers. The raiser finds this hybrid to be perennial and polycarpic, and states that the first plants raised (in 1934) are still alive.

Narcissus 'Dava.' A.M. for exhibition, May 4, 1937. A Leedsii variety (4a), with flowers 4 inches in diameter well-poised on stout 19-inch stems. The white, broad, smooth, overlapping segments were 1½ inch long, the cream corona 1⅞ inch long, expanded at the mouth. Raised by The Brodie of Brodie and shown by Mr. G. L. Wilson, Broughshane, Co. Antrim.

Odontoglossum × **Jacquinetta**. A.M. May 25, 1937. An elegant hybrid obtained by crossing *O.* × 'Frank Reader' with *O.* × 'Tityus.' The spike bore 5 flowers, with reddish-crimson blotches on a rose-tinted ground. Shown by Messrs. Armstrong & Brown.

Odontoglossum × 'Molyneux' var. 'Shalstone.' A.M. May 4, 1937. A very pretty hybrid obtained by crossing *O. crispum* with *O.* × *plumptonense*. The tall spike bore 11 large flowers with well-developed sepals and petals suffused with rose and marked with reddish-purple. The labellum is lighter and bears a yellow crest. Shown by H. S. Wharton, Esq., "Shalstone," Templewood Avenue, London, N.W. 3.

Paeonia 'Argosy.' A.M. May 25, 1937. From Major F. C. Stern, O.B.E., Goring-by-Sea. A fine hybrid Paeony raised by Professor A. P. Saunders of New York from *P. lutea* crossed with a variety of *P. suffruticosa*. It is a handsome plant with large bi-pinnate leaves with pale-green, somewhat glaucous, narrowly lobed leaflets. The flowers are 7 inches across and have rather narrow primrose-coloured petals blotched at the base with carmine.

Paneratium illyricum. A.M. May 25, 1937. From Dame Alice Godman, D.B.E., Horsham. A pretty bulbous plant for planting under a warm wall, where it will produce numerous strap-shaped, somewhat glaucous leaves about 18 inches long, and scapes of much the same height each bearing 5 to 8 flowers. These are 3 inches in

diameter, with narrow, spatulate white petals and long stamens with conspicuous stipular outgrowths.

Prunus 'Asor.' A.M. April 6, 1937. From Collingwood Ingram, Esq., Benenden. This is believed to be a hybrid of *Prunus incisa* × *P. serrulata* var. *sachalinensis*, and bears a strong resemblance to the latter parent. The flowers are borne in pairs from buds on both young growths and spurs, and have pale rose-pink elliptical petals and red sepals.

Prunus serrulata 'Kanzan.' F.C.C. May 4, 1937. From Mr. R. C. Notcutt, Woodbridge. This is one of the finest and most popular of the double-flowered pink cherries, and forms an upright tree with rounded top up to 20 feet high. The flowers are over 2 inches across, with about 30 clear pink petals, and are carried in pendulous clusters of 3-5 among the prettily bronze-tinted young foliage. The name 'Hi-zakura,' which is a synonym for 'Ichiyo,' a double white variety, has very generally been applied to the present variety.

Renanthera imschootiana var **'Cardinal.'** A.M. May 25, 1937. The inflorescence bore numerous reddish-vermilion flowers of a richer tint than usually seen in this species. Shown by Messrs. Armstrong & Brown.

Rhododendron 'Britannia.' F.C.C. May 22, 1937, after trial at Exbury. This fine variety received A.M. when shown by Messrs. Van Nes in 1921 and is described in the JOURNAL, R.H.S., 47, xlii.

Rhododendron 'Elspeth.' A.M. April 24, 1937, after trial at Exbury as a hardy flowering shrub, growing better in semi-shade than in full sun. Habit compact and free-flowering, with leaf-blades $4\frac{1}{2}$ - $5\frac{1}{2}$ inches long and $1\frac{1}{2}$ - $2\frac{1}{2}$ inches broad, oblong-lanceolate; upper surface bright green; petiole 1 inch long, glabrous. Truss loose with 9 to 12 flowers; rachis $\frac{3}{4}$ inch long. Calyx very short. Corolla openly campanulate, about $3\frac{1}{2}$ inches across, pink in bud, opening pink, centre fading to apricot. Stamens 10, filaments hairy at base. Style long, curved, glabrous. Sent to Exbury for trial by Messrs. Slocock, Goldsworth Nursery, Woking.

Rhododendron 'Handel.' A.M. May 15, 1937, after trial at Exbury. A fairly compact hardy shrub in habit. Leaves broadly elliptic, leathery, 4-6 inches long and half as wide, dark green above, light green below, midrib and primary veins prominent; petiole $\frac{3}{4}$ inch long. Truss compact with 14 to 16 flowers; rachis 1 inch long. Calyx small, uneven. Corolla broadly campanulate, about $2\frac{1}{2}$ inches long and 3 - $3\frac{1}{2}$ inches wide, light yellow, flushed green, with green spots on upper side, lobes 5. Stamens 10, unequal, filaments and style hairy towards the base.

Rhododendron Lindleyi. F.C.C. May 4, 1937. From Admiral Walker-Heneage-Vivian, Clyne Castle, Swansea. A fine flower and foliage plant for general garden use, with very sweet-scented funnel-shaped flowers up to 5 inches wide by 4 inches deep, pure white, but tinged with pink at the ends of the lobes when old, arranged in a single whorl of up to eight flowers. The slightly bullate ovate-lanceolate



FIG. S7 P. D. WILLIAMS MEMORIAL MEDAL
(see p. 327)

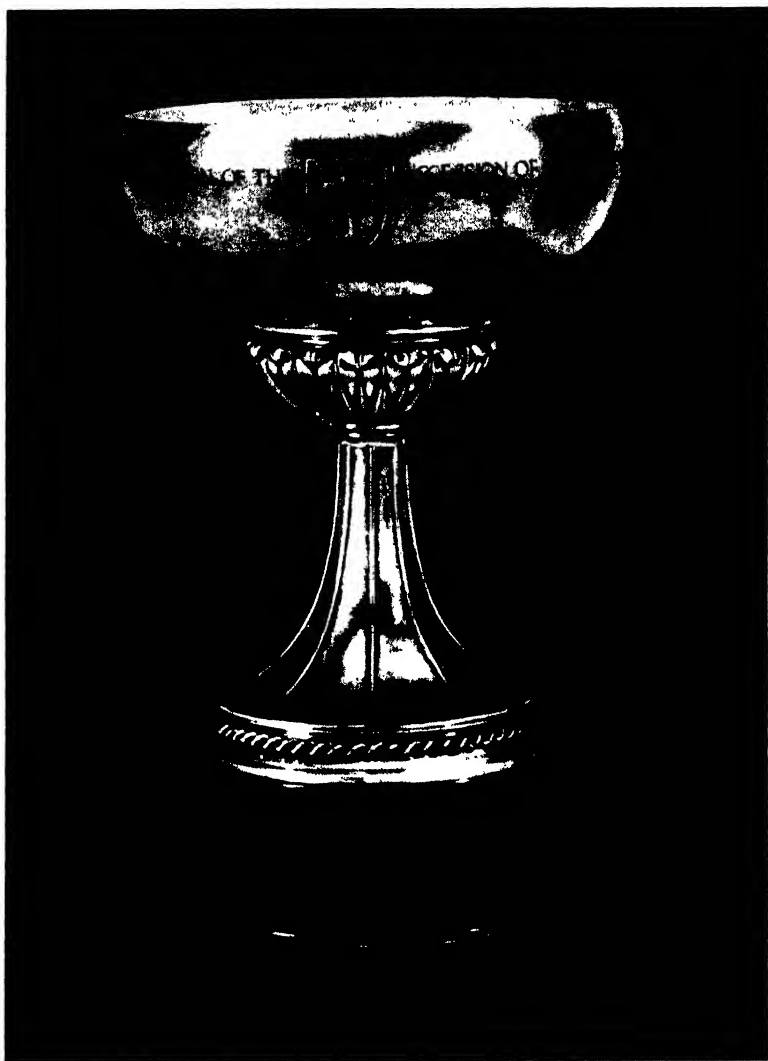


FIG. 88.—SILVER GILT CUP AWARDED AT CHELSEA FLOWER SHOW 1937.
(see p. cxiii)

[To face p. 325.]

leaves are up to 7 inches long by $1\frac{1}{2}$ inch broad, glabrous, with small red glandular dots on the under-surface.

This plant is said to be hardier than the plant which received an Award of Merit in 1935, and also differs in its sweeter scent, and its larger flowers and leaves.

Rhododendron 'Marinus Koster.' A.M. May 22, 1937, after trial at Exbury. A hardy free-flowering shrub, with oblong-lanceolate leaves, leathery, dark green above and yellowish-green beneath. Petiole 1 inch long, slightly grooved. Truss large, of 12 to 14 flowers on a glabrous rachis 3-4 inches long; pedicels 2 to 3 inches long, densely clad with short-stalked glands. Flowers 4 to 5 inches wide. Corolla almost flat when fully open, deep pink in bud, centre fading white with pink edges and large purple blotch on upper corolla lobe; stamens 14-16, unequal, shorter than corolla lobes, hairy towards the base. Sent to Exbury for trial by M. Koster.

Rhododendron 'White Swan.' A.M. May 15, 1937, after trial at Exbury. A free-flowering hardy shrub of open habit; leaves oblong to oblong-elliptic, leathery, 6-7 inches long, $2\frac{1}{2}$ -3 inches broad, dark green above, under surface yellowish-green with 14-16 pairs of primary veins. Petiole about 1 inch long, rounded, glabrous. Inflorescence: an upright truss with 16 to 18 flowers, rachis $4\frac{1}{2}$ -5 $\frac{1}{2}$ inches long, glabrous; pedicels 2 inches long, glandular; calyx 5-lobed, uneven, 2 upper lobes, $\frac{1}{2}$ inch long; corolla openly campanulate about 3 inches long, 4-5 inches broad, pale pink fading to white with green eye at base of upper corolla lobe, lobes 5, rounded, crenulate; stamens 14-15, uneven; style, 2 inches long, glandular, slightly curved. Sent to Exbury for trial by Messrs. Waterer, Sons & Crisp, Bagshot.

GARDEN NOTES.

Dutch Yellow Crocus in Wet Ground.—I think it is generally admitted that the Yellow Crocus should be grown in well-drained soil, and I do not believe that anybody would plant them, wilfully, in a wet place.

In January 1935 a friend gave me twenty-five corms of Dutch Yellow Crocus. I had no space available in the garden where I grow Crocuses—the time was late for planting, and the weather was very wet. I planted them at the edge of my Lily Pond, and they flowered profusely in March—though frequently under water. The interesting point is that they have multiplied in a very extraordinary manner. Now (March 1937), where I planted one corm, there are from eight to twelve, and their flowers are finer and last longer than any others in the drier garden.

The soil in which they are planted is a very rich black water-logged peat, and every winter it is for weeks at a time under water to a depth of one to four feet.

I think we all realize that the multiplication of Yellow Crocus (by corms only, no seed being formed) is not as a rule so rapid a process.

Wet and flooded soil seems to favour the process.—*Peyton T. B. Beale.*

The Tree Heath, Erica arborea.—This Mediterranean Heath grows well in many gardens in the southern counties, and the purpose of this note is to point out how much superior the alpine form, *arborea alpina*, is in all ways. Throughout the winter it preserves a cheerful green, whereas the ordinary species is rather dingy. The flowers are much more freely produced on the alpine form and have the great advantage of being more sweetly scented. In *E. arborea* the scent resembles very closely that of the White Thorn or May, but in the var. *alpina* it is much more honey-like and is more spread on the air, and it can be distinguished several yards away on a still day in spring.

On light, sandy soil the alpine form will make a large tree. In my own garden a specimen planted some twenty years ago is now 8 feet high and the same through.

If the coarser branches are occasionally pruned back in the spring, it can easily be prevented from growing leggy, and it then maintains its green down to the ground.—*E. A. Bunyard.*

THE P. D. WILLIAMS MEDAL.

A DESIRE having been expressed that the Society should establish a memorial to the late P. D. WILLIAMS, the Council decided in December, 1935, that the memorial should take the form of a medal to be awarded in alternate years for Daffodils and Rhododendrons, the two plants in which P. D. WILLIAMS was especially interested. A fund was accordingly opened, and a sum of £372 7s. 9d. was subscribed. Meanwhile the Council commissioned Mr. LANGFORD JONES to prepare a design for the medal, and it will be seen from the illustration which appears at fig. 87 that he has been successful in producing an excellent representation of P. D. WILLIAMS. The Daffodil and Rhododendron appear on the reverse.

The first specimen of the medal, struck in gold, has been presented to Mrs. P. D. WILLIAMS. The first medals to be offered for award were those in a special class at the 1937 Daffodil Show for six *incomparabilis* and/or *Barrii* varieties with red or orange colouring in the cup. To mark the inauguration of the medal, the Council decided in September, 1936, to present silver medals to the following societies for award at their Daffodil Shows in 1937: the National Daffodil Society of New Zealand, the Royal Horticultural Society of Victoria, Australia, and the Amateurs' Horticultural Society of Hobart, Tasmania.

In 1938 the Medal will be awarded for Rhododendrons, and the precise terms of the Award will be announced in due course.

BOOK REVIEWS.

"Rosecraft: A Guide to Rose Growing." By Harry A. Day. 8vo. 86 pp. (Methuen, London, 1937.) 2s. 6d.

This little book, which is perhaps somewhat unusual in form, consists of a number of chapters, of which the first eight deal with such subjects as perfume, colour, cultivation, propagation and enemies of the Rose, followed by four more or less descriptive of different varieties, then by a short note on Roses under glass, and the book winds up with a diary of Rose work month by month through the year. A considerable part of the chapter on perfume consists of the description of the making of pot pourri by salting down rose petals, lavender and fragrant leaves, which in effect follows the elaborate receipt given by Miss Jekyll in *Home and Garden*, p. 164. This method involves careful preparation and attention during a large part of the year. It is unlikely that many of those for whom this book is presumably written will be in a position to take the time and trouble necessary to secure success in this method.

Apart from this, the amateur rose-grower will find the essential information he requires intelligibly and concisely stated, and the little book a useful companion.

The fact that our author may not always follow accepted methods may be useful in leading to experiment, but it may be well to warn the inexperienced not to dig in fresh manure when planting his new roses.

The book contains some mistakes which should be corrected in a second edition, e.g. liver of sulphur, recommended as a spray for mildew, on p. 47 is called "sulphate potassium," a very different salt from sulphide of potassium, which is intended and correctly mentioned on p. 45.

The names of several roses also require correction, e.g. 'Danæ' is several times written 'Daneë,' 'W. R. Smith,' correctly stated in several places, is, on p. 55, called 'Mr. R. Smith,' and the middle name of Molly Sharman Crawford is not "Sherman."

H. R. DARLINGTON.

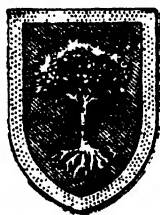
"Profitable Culture of Vegetables." By Thomas Smith. New edition by W. E. Shewell-Cooper. 8vo. xiv + 334 pp. (Longmans, Green, London, 1936.) 7s. 6d.

We have regarded Mr. Thomas Smith's "Profitable Culture of Vegetables" as the best book on its subject for gardens of all grades in England ever since its publication in 1911. It has been reprinted several times, and now a new edition has appeared, including chapters on overhead irrigation, mechanical cultivation, and soil sterilization. To make room for these certain parts have been omitted, particularly, but not only, parts dealing with potatoes and mushroom. These omissions have not improved the book, which originally contained little if anything which could profitably be dispensed with. The additions are, especially so far as mechanical cultivation goes, not sufficiently detailed to be as helpful as the clear directions contained in the original edition. They were doubtless made in the interests of the market grower, but the original book had a wider appeal and was equally useful to the allotment gardener. It is only less useful than the last because of the omissions, for fortunately little change has been made in the directions for cultivation. For the market grower something more might have been done regarding the recommendations of varieties. Only here and there is anything said regarding the special value of varieties for canning for instance, and the canner requires specially grown produce, not the outcasts of a bumper crop; and much might have been done by indicating synonyms.

The book remains a good one.

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August 1937

THE GENUS FRITILLARIA IN THE BALKAN PENINSULA AND ASIA MINOR.

By Dr. W. B. TURRILL.

[Read April 6, 1937; P. ROSENHEIM, Esq., in the Chair.]

LAST spring I had the honour of giving a general account of the genus *Fritillaria* to the Lily Committee. It was impossible in the time then available to do more than indicate in a very brief manner the main problems which are raised by a study of this interesting genus. I suggest that this afternoon we should consider in some detail the *Fritillaries* of the Balkan Peninsula and Asia Minor, rather than roam at large over the genus. Before we concentrate on the species of these areas, however, it may be well to recall a few characteristics of the genus as a whole.

For reasons we will summarize later, it is very difficult to assess the number of species in the genus *Fritillaria*, but, with our present knowledge, an estimate of one hundred species may be considered to give a fair idea of its taxonomic size. Splitters could double, lumpers could halve, this number. In distribution the genus ranges through temperate Europe, North Africa, the Orient, the Himalayan region, across Central Asia to China and Japan, and down the temperate western part of North America. Our knowledge of the Central Asiatic and Himalayan species is far from complete, but apart from these areas we know two regions which show an exceptional diversity of species—Western North America and the Eastern Mediterranean region. It is with the latter of these that we are specially concerned this afternoon.

VOL. LXII.

Fritillaria is undoubtedly closely similar in morphological structure to *Lilium*, and there is thus justification in including accounts of its species in the *Lily Year-Book*.

One of the many difficulties the botanist encounters in studying this genus is the inadequacy of many of the earlier, and some of the later, descriptions. As I wish to emphasize certain points of structure when, in a few minutes, we deal with named species, I would remind you of a few morphological terms. The vegetative parts present some difficulties because of their variability, but apart from that the shape, size, arrangement and colour of the leaves can be precisely described in ordinary terms. The bulbs, however, require much more study and the accumulation of reserves of material for careful analysis. Owing to the kindness of Miss BECK I was able last year to make notes on the bulb structure of a considerable number of species, and I was surprised at the range of characters between the species and the number of obviously important characters which had not been included in botanical studies. The bulbs of *Fritillaria* could, however, be made the subject of a separate talk, and the matter is only mentioned here since it is so obviously one in which the botanist must ask the help of the horticulturist.

Turning to the reproductive parts, which are often said to be more conservative than the vegetative parts and therefore to give better characters for a sound classification, we find the simple Liliaceous flower structure characteristically developed. The perianth consists of 3 outer and 3 inner tepals.* Often these are alike in shape, size, and colour markings—as, for example, in many *Fritillaria latifolia* varieties. In other species there is greater or less difference between the members of the outer and inner whorls—as, for example, in *F. acmopetala*. Several interesting features of the perianth may be noted. First, the constant occurrence of a nectary on the inner side of every tepal. Frequently this nectary is ovate or oblong, near the base of the tepal, and often relatively deep; more rarely it extends for the greater length of the tepal as a shallow narrow furrow. A second matter is the occurrence and the distinctness of tessellation—chequer-board markings, reminiscent of a Roman pavement. This character occurs in various species, but is not necessarily a constant feature of all varieties of any one species. The same remark holds also for the occurrence of longitudinal bands of a distinct colour (technically sometimes termed fasciae) which often mark the back of the outer, inner, or all the tepals. The stamens are, like the tepals, usually described as 3 + 3 and are clearly hypogynous. The presence or absence of papillae on the filaments and the size and shape of the anthers are characters to be noted, though the latter should be given for both the unopened and the opened anthers. The ovary is clearly trilocular, with numerous ovules in each compartment. The terminal style is most often trifid with three stigmatic arms which spread or

* Tepals—a term used for the parts of the perianth when the inner and outer leaves are much alike.

recurve and are receptive on the inner (upper) side. In some species, of which *F. glauco-viridis* (fig. 89) is a good example, the style is practically entire, though it may be furrowed, and the apex shows only a slight indication of being 3-lobed. The fruit is always a 3-valved capsule, with the lines of dehiscence passing longitudinally down the compartments. The numerous seeds are flattened and often more or less winged.

After this short general introduction we turn to consider the species of the Eastern Mediterranean region, commencing with the Balkan Peninsula.

F. macedonica Bornm. was described in 1923 from specimens collected on the Albanian-Macedonian frontier mountains west of Struga in the Jablanica planina. It has since been collected by Dr. GIUSEPPI, and later (1935) by the Rev. and Mrs. THOMPSON at 1910 metres altitude. It is related to the European *F. Meleagris* and to the Caucasian *F. latifolia*, but the wild material I have examined seems to show that it is a distinct species. The perianth is broadly campanulate, the tepals of a lurid purple showing more or less distinct tessellation.

F. pontica Wahlenb. is a very common species in some parts of South Macedonia, Thrace, and Bulgaria, and extends also into northern Asia Minor. The leaves are usually fairly broad and more or less scattered along the stem, or sometimes paired, except that the three uppermost are nearly always in a whorl and extend above the flowers. The colour of the perianth varies greatly, from dull dark purple to yellowish-green with various paler and lighter markings, but without tessellation. Longitudinal bands of colour may or may not be clearly developed. On the Athos Peninsula *F. pontica* grows abundantly and flourishes in shady situations on banks, in woods of a fairly open type, and at medium altitudes above the macchia. A giant form has been received from Mr. G. P. BAKER, cultivated in his garden from bulbs collected on the European side of the Bosphorus. This illustrates yet another difficulty met with in this genus—the unknown degree of plasticity of the plants due to different environmental conditions. The puzzling overlapping of species—or supposed species—is partly due to this, and is well seen in the series of paintings made by Lt.-Commander FURSE, which have been exhibited before this Society and many of which are preserved in the Lindley Library.

F. graeca Boiss. et Spr. (fig. 90) is one of the commonest species in parts of Greece and extends also into Thessaly, Epirus, Macedonia, and Bulgaria. Though variable in size and general habit it is usually distinguishable from other Greek species by the well-marked fasciae on all the tepals. Typically it is a slender plant, but I am unable to draw any sharp line of distinction between *F. graeca* and *F. Guicciardii* Heldr. et Sart. The latter is supposed to have a stouter stem, to be dwarfer, to have more glaucous leaves, 2-3 flowers, more distinct fasciae, and a campanulate-connivent, not campanulate-patent, perianth. None of these characters seems to be constant, and they are not regularly

correlated. For what they are worth—and in my opinion they are taxonomically worth very little—they may depend in the wild on habitat differences connected with increasing altitude, especially for the expression of characters deemed to distinguish *F. Guicciardii*. The variety *Gussichiae* Deg. et Dörf. from Macedonia and Serbia, is, perhaps, a little more distinct by its broader ovate- to elliptic-oblong leaves, its usually larger tepals, less clearly marked fasciae, and its scabrid filaments.

F. macrandra Baker, often known by its synonym of *F. rhodocanakis* Orph., is, so far as we know, limited in its natural distribution to the island of Hydra, off the east coast of the Peloponnese. It is probably related to *F. graeca*, but has somewhat smaller flowers with the tepals of rather a different shape (often more strongly obovate) and obscurely tessellated. This is a species it would be useful to study in the wild.

F. obliqua Ker-Gawl. is limited to Greece, where it has been recorded from a few localities in Attica. Its synonym, *F. tristis* Heldr. et Sart., suggests the uniformly dull dark purple colour of the perianth. The filaments are papillose, and the style shortly but distinctly trifid. The larger size of the whole plant, including the flowers, distinguishes the species from the Caucasian *F. caucasica*.

F. Drenovskii Deg. et Stoy. (fig. 91) was only described in 1931 from material collected on Mt. Ali-Botus in the south-west of Bulgaria (Bulgarian Macedonia), not far from the Greek-Bulgarian boundary. Very shortly afterwards specimens were received from Mr. H. G. ЧИСК, who had collected them on Mt. Pangaion west of Kavalla in South Macedonia. The slender stems and leaves, the small flowers, and the narrow tepals make this a very distinct species. It has been introduced recently into cultivation and is already beginning to show some variation—from what cause is unknown.

A group of Fritillaries very common in the west of the Balkan Peninsula, and represented again in Macedonia, Thrace, Bulgaria, Russia, and the Caucasus, as well as in South France and Italy, is in a very unsatisfactory taxonomic condition. There is little agreement amongst authors as to how many species there are, and I am still collecting material and information before deciding to lump or to split. If the whole group be placed under one species, *F. nigra* Mill. is the earliest name I have traced. Other names, which would then become synonyms, include *F. montana* Hoppe, *F. gracilis* (Ebel) Asch. et Graebn., *F. tenella* M. Bieb., *F. orientalis* Adam, *F. neglecta* Parl., and *F. racemosa* Ker-Gawl. In this group no character or combination of characters appears to be constant. Populations I studied in Dalmatia and Hercegovina showed considerable variation, and here the difficulties of naming and of classification are not due to cultivation or to hybridization in gardens.

All the species so far named have distinctly trifid styles. There are a few species occurring in the eastern parts of the Balkan Peninsula which have entire styles, at most with slight lobing at the apex.



FIG. 89. *ERITRICHIA GLAUCO-VIKIDIS*

[*Id. fac.* p. 332.



FIG. 90. FRITILLARIA GRAECA.

($\frac{1}{2}$ size.)

F. Ehrhartii Boiss. et Orph., also known by its synonym, *F. Regis-Georgii* Heldr., occurs in several of the islands of the Aegean Sea. It has rather broad lower cauline leaves, and the tepals are said to be lurid purple, not tessellated, and to have an obtuse yellow mucro. I have not seen living material, and the mucro is not obvious in the dried material available.

F. Stribrnyi Vel., from South Bulgaria and (according to Hayek) Macedonia, has very leafy stems and rather long, narrow, obconical perianths, with glaucous purple non-tessellated tepals and scabrid filaments. A yellowish-flowered variety has been recorded. The species is also said to occur in the Taurus in Asia Minor. I have not seen specimens from Turkey, and such a discontinuity in distribution would be surprising.

We turn now to consider some of the species from Asia Minor.

F. latifolia Willd. is a very variable species which has long been in cultivation. A native of the Caucasus and North Persia, it is one of the larger-flowered species of the genus, with broadly campanulate perianths which have conspicuous "shoulders," and leaves clustered around the usually solitary flower. The tepals are frequently tessellated, and the nectaries usually well marked externally by a green ridge. Fairly well-marked varieties—as I believe them to be—are *aurea* (Schott), *lutea* (M. Bieb.), and *nobilis* (Baker). The flowers of these are generally somewhat smaller than in typical *F. latifolia*, and the habit often more dwarfed. They all come from the Caucasus area in the broad sense, and have similar shortly but distinctly trifid styles which are rather stout. *F. nobilis* is often grown under the incorrect name *F. messanensis*. *F. latifolia* varieties are said to have crossed, or been crossed, under cultivation with several other species.

F. caucasica Adam, also known as *F. tulipifolia* M. Bieb., is another Caucasian species. Typically this has relatively broad cauline leaves and dull lurid purple perianths with the outside of the tepals markedly glaucous. It is closely related to *F. armena* Boiss., and though this has smaller flowers and papillose filaments, I am not sure it is more than a variety of *F. caucasica*.

The yellow-flowered *F. Sibthorpiana* (originally figured and described as a Tulip) is a puzzling plant, whose status relative to other species, and especially to *F. armena* and *F. caucasica*, remains in doubt. SIBTHORP and SMITH figure it in the Flora Graeca, t. 330, as a small rather inconspicuous plant with orange-yellow tepals from Asia Minor and Greece. HALÁCSY gives it from Euboea and Messenia, and BOISSIER in addition from western Anatolia.

F. acmopetala Boiss., from Asia Minor and Syria, was well figured in the Botanical Magazine, t. 9148, and adequately described there by the late Dr. O. STAFF, who did much to clear up the taxonomy of the group to which it belongs. The inner tepals have a conspicuous spreading blunt mucro arising from a broad, almost truncate top.

F. Elwesii Boiss. has narrower perianths and tepals and is a native of Anatolia. FORBES and, later, ELWES collected it in the Dembra

Gorge in southern Lycia. It was wrongly figured as *F. acmopetala* in the Botanical Magazine, t. 6321.

Two closely related species from North Persia are natives outside the area with which we are mainly concerned this afternoon. As, however, they are both in cultivation, sometimes under wrong names, I refer to them here.

F. Olivieri Baker has typically large bell-shaped perianths. In full flower it is a handsome plant. It grows at a rather high altitude—probably round about 2000 m.—and seems to occupy a fairly wide belt on Mt. Elwend, its flowering following the melting of the snow. It is also recorded from mountains east of Kermanshah.

F. karadaghensis Turrill, originally from the Kara Dag, north of Tabriz, appears to be a very variable plant under cultivation. Unfortunately the history of so many cultivated specimens has been lost, and I am often somewhat sceptical of their stated pedigrees. The typical plant was figured in the Botanical Magazine, t. 9303. The relationship is with *F. Olivieri* Baker and with *F. crassifolia* Boiss. et Huet from Armenia. Northern Persia is particularly rich in species of *Fritillaria*, and it is possible that the variability of *F. karadaghensis* may be a sign of hybridization in its ancestry.

Finally we will consider three Asia Minor species belonging to the *Olostyleae*, with the style entire or obscurely 3-lobed, additional to *F. caucasica* and *F. armena*.

F. Forbesii Baker from Lycia has a slender habit, narrow leaves, and generally recalls *F. Elwesii*. It has, however, unlike that species, a long slender papillose entire style.

F. dasyphylla Baker is also a native of Lycia and is not uncommon in cultivation. It too has a very slender, quite entire style, and is rather a charming plant.

F. glauco-viridis Turrill (fig. 89), from southern Asia Minor, has a much stouter style and is usually a taller plant with relatively narrow perianths with spreading tips to the tepals. The name refers to the colour of the outside of the perianth. This plant was in cultivation under the name *F. viridis* for some years before it was botanically described and validly named.

In this account of the *Fritillaries* of two of the Eastern Mediterranean districts a number of less known or uncertain species have not been considered. Attention has, however, been purposely drawn to some of the unsolved problems. These are all connected closely with our lack of full data regarding the behaviour of the plants in the wild and under cultivation. I sometimes feel that the species concept breaks down more or less entirely in this genus. Certainly it is often impossible to draw hard-and-fast lines between the species, since many of them overlap in various characters in a most perplexing manner. While variation in wild material, whatever its causes, makes for taxonomic confusion in such a group as *F. nigra—gracilis* (fig. 92)—*montana—tenella*, variation in material under cultivation is much worse. We need very careful, long-continued, and fully recorded studies of the

plasticity of any genotype, *i.e.* of the variation directly occasioned by known environmental differences on plants of exactly the same inner (chromosome and gene) constitution. Until data from such experiments are available and can be correlated with field studies in the wild, the botanist can do little more than suggest a tentative classification based on names originally applied, most often, to one type collection. Such type specimens may be taken as points and actual plants may be placed with reference to one or several of them. Whatever schemes of classification may be suggested in the future and whatever theories may be developed to account for the puzzling variation, there is no doubt that *Fritillaria* is a genus in which co-operation between the botanist and horticulturist is essential if each is to obtain all that these charming plants have to offer.

The *Fritillaries* are neither aristocratic like the lordly Lilies nor socialistic like the gregarious *Scillas* and *Grape-hyacinths*. They are modest individualists, hiding their virtues in a drooping flower, and only those can appreciate their good points who look for neither blatant mass effects nor for sensations in size, colour, and odour. There is, however, an increasing number of discerning horticulturists who are cultivating plants of this genus, and I shall be very glad to give any of them help in determining specimens and in suggesting how interest in *Snake's-heads* can be increased.

CONTRIBUTIONS FROM THE WISLEY LABORATORY.

LXXXII.—THE ROOT - KNOT EELWORM, *HETERODERA MARIONI* (Cornu) Goodey, AND ITS RELATION TO PLANTS GROWING OUTDOORS IN THE BRITISH ISLES AND IN CERTAIN EUROPEAN COUNTRIES.

By G. FOX WILSON, N.D.H., F.R.E.S., F.L.S., Entomologist.

THE Root-Knot Eelworm, *Heterodera marioni* Goodey (*H. radiculicola* Greef), is primarily a pest of glasshouse plants (*e.g.* Tomatos, Cucumbers, and Begonias) in the British Isles, but it is known also to attack plants growing in the open in this and certain other countries in the North Temperate zone, and the purpose of this article is to place on record a number of such infestations which have come to light and to suggest measures for its control in the open garden.

GOODEY * states : " In temperate regions the parasite is not as a rule a serious pest under open field conditions . . . , " and that " it is apparently not killed by freezing or by exposure to very low temperatures." Again,† this author states : " As soil temperature is one of the principal factors controlling the activity of this parasite it is interesting to note that it has been found attacking the roots of plants growing out-of-doors in more northerly climes than ours (see Table II). It would appear, however, to cause comparatively little damage to plants growing in these more temperate regions and is mainly a serious pest of out-of-door crops in warmer parts of the world."

While the latter statement may apply to plants growing under the more open conditions of the field, the reverse may be true in some instances, as in gardens where the conditions are more favourable, both as regards soil and site, to the persistence of the eelworms. The higher soil and air temperatures existing in sheltered gardens render the conditions more favourable to the eelworms, so that they persist from one season to another.

Dr. TRIFFITT ‡ considers that there is a danger of the eelworm becoming established as a field parasite, for she states (p. 208) : " The potential economic importance of the establishment of *H. radiculicola* as a field parasite in Great Britain will readily be appreciated in view of the spread of *H. schachtii* (the Potato Eelworm) during the last fifteen years."

The Root-Knot Eelworm was first discovered in 1855 by BERKELEY § on Cucumber roots in an English glasshouse. The organisms present

* Plant Parasitic Nematodes, 1933, pp. 159-191. .

† Annals Applied Biology, 1936, vol. xxiii, pp. 219-222.

‡ Journ. Helminthology, 1931, vol. ix, pp. 205-208.

§ Gardeners' Chronicle, 1855, April 7, p. 220.



FIG. 91. ECHINARTA DRINOVSKII



FIG. 92. *IRIDIARIA GRACILIS*.



FIG. 93 — CARROTS INFECTED BY ROOT KNOT LEEWORM
(Note large galls.)

in the galls were recognized as worm-like creatures, and the term "vibrios" was given them.

The name under which this eelworm was known for many years was *Heterodera radicolica* Greef, but GOODEY* has recently shown that the specific name *marioni*, proposed by CORNU in 1879, should stand as the earliest valid one.

This eelworm is considered in many tropical and sub-tropical regions to be one of the most serious pests of economic plants, including nearly every crop of agricultural and horticultural importance.

A list of plants found to be infected with *H. marioni* when grown in the open in the British Isles and in certain European countries is given in Tables I and II.

TABLE I.

Records of the Occurrence of Heterodera marioni attacking Plants in the open in the British Isles.

No.	Host Plant.	Locality.	Month and Year.	Recorder.
A. CULTIVATED PLANTS.				
1	<i>Clematis stans</i> . . .	Cambridge	April 1898	Hosking
	<i>Clerodendron foetidum</i> . . .	"	" 1910	Chittenden
2	<i>Clematis Vitalba</i> . . .	"	" 1910	"
3	<i>Clematis integrifolia</i> . . .	Cardiff	June 1911	"
4	<i>Daucus Carota</i> (Carrot) . . .	Nr. Bromham, Wilts.	Aug. 1931	Triffitt
	<i>Pastinaca sativa</i> (Parsnip) . . .	"	"	"
	<i>Beta vulgaris</i> (Beetroot) . . .	"	"	"
	<i>Phaseolus vulgaris</i> (Runner Beans) . . .	"	"	"
5	<i>Pastinaca sativa</i> (Parsnip) . . .	Slough	1932	Brown†
6	<i>Linum perenne</i> (Flax) . . .	Wraybury, Bucks.	Jan. 1933	Min. of Agric.†
7	<i>Daucus Carota</i> (Carrot) . . .	Bury St. Edmunds	July 1935	Fox Wilson†
8	<i>Apium graveolens</i> (Celery) . . .	Cork, I.F.S.	Aug. 1935	" †
9	<i>Chrysanthemum coccineum</i> (Border Pyrethrum) . . .	Wisbech	Mar. 1936	" †
10	<i>Petroselinum sativum</i> (Parsley) . . .	Treherbert, Glam.	Oct. 1936	Edwards
	<i>Daucus Carota</i> (Carrot) . . .	"	"	"
	<i>Pastinaca sativa</i> (Parsnip) . . .	"	"	"
B. WEEDS.				
4	<i>Senecio vulgaris</i> (Groundsel) . . .	Nr. Bromham, Wilts.	Aug. 1931	Triffitt
	<i>Stellaria media</i> (Chickweed) . . .	"	"	"
	<i>Capsella Bursa-pastoris</i> (Shepherd's Purse) . . .	"	"	"

According to GOFFART (1934 †), PAPE states that the following plants serve as hosts in the open—namely, Carnation, *Clematis*, *Lathyrus*, *Pæony*, *Primula*, *Rose* and *Violet*.

* Journ. Helminthology, 1932, vol. x, pp. 21-28.

† Infection confirmed by Dr. GOODEY.

‡ Zeitschr. für Parasitenkunde, 1934, Bd. 7, Heft I, pp. 61-70.

TABLE II.

Records of the Occurrence of Heterodera marioni attacking Plants in the open in France, Germany, Denmark, Norway, and Austria.

Host Plant.	Locality.	Year.	Recorder.
<i>Clematis Vitalba</i>	France	1879	Cornu
Primula	Austria	1892	Dalla Torre
<i>Clematis Vitalba</i>	France	1900	Chiffot
<i>Anemone sylvestris</i>	Denmark	1920	Rostrup
Chrysanthemum	"	"	"
<i>Sambucus nigra</i> (Elder)	"	1924	"
Tomato	Norway	1926	Schøyen†
Lettuce	Stettin, Germany	1927	Koltermann†
<i>Paeonia</i> 'arborea' (Tree Pæony)	Lyngby, Denmark	1929	Bovien
<i>Anemone sylvestris</i>	Berlin-Dahlem, Germany	1930	Goffart†
Red Clover	"	"	"
Lucerne	"	"	"
Pea	"	"	"
Potato	"	"	"
Vetch	"	1931	"
<i>Convallaria</i>	Germany	1932	Pape*
Sainfoin	Berlin-Dahlem, Germany	1933	Goffart†
Iris species	Denmark	"	Bovien†
'Vinterasters' (Aster species)	"	"	"
<i>Brassica oleracea</i> var. <i>acephala</i>	Germany	"	Fischer†
Rosa	"	"	Goffart (in litt)
Cabbage	Denmark	1934	Bovien
Melon	"	"	"

Details concerning attacks on Plants grown in the open in the British Isles.

I.‡ Mr. A. HOSKING, late of the Cambridge Botanic Garden, referred in 1911 § to nodules on the roots of non-leguminous plants which he had noted at Cambridge in April 1898. Mr. HOSKING has kindly supplied details of the infection (letter, August 18, 1936). "I remember seeing the nodules on the roots of *Clematis stans* and *Clerodendron foetidum*. This was at the time when a good deal of attention was being given to the nodules found on the roots of the Leguminosae, and I wondered as to the nature of the nodules which occurred on plants not related to this Order. In both cases the plants appeared to be healthy, and certainly they did not have the appearance of eelworms, but the roots were not microscopically examined. The *Clematis* was grown with several other species in a small bed in the open garden, surrounded by grass, and the soil of a poor gravelly nature, and probably containing lime. The *Clerodendron* is allied to another species, namely *C. Bungei*, and both species were grown

* Krankheiten und Schädlinge der Zierpflanzen, 1932, Berlin.

† Zetschr. für Parasitenkunde, 1934, Bd. 7, Heft I, pp. 61-70.

‡ (Number corresponds with Number in Table I.)

§ Gardeners' Chronicle, 1911, vol. xlix, 10th June, p. 374.

out-of-doors in a border surrounding a range of plant houses (at the north-east corner of the Succulent House). The soil in these borders was partly made up with compost (probably old potting soil), and in both cases the plants were growing in the places mentioned from 1894 to 1905, but how long previous I do not know. No Melons, Cucumbers nor Tomatos were cultivated at the Botanic Gardens in those days."

2. Mr. F. J. CHITTENDEN informs me that he received plants of *Clematis Vitalba* during 1910. The source of the eelworm-infected plants is not known, but they had been grown in pots plunged in nursery beds.

3. Mr. H. EVANS, Llanishen, near Cardiff, stated in 1911: * "Three weeks ago I noticed some nodules on the roots of *Clematis integrifolia*, and these have since been pronounced by Prof. Cavers, of Southampton, to be typical Leguminous nodules." Mr. CHITTENDEN, wishing to ascertain whether the roots of these plants had been infected with Root-Knot Eelworm, similar to the infection on *Clematis Vitalba* received at Wisley in 1910 from an entirely different source, wrote to Mr. EVANS requesting him to submit material similar to that submitted to Prof. CAVERS. The material was received and subjected to a critical examination, and the following note appeared in the *Gardeners' Chronicle*: † ". . . The swellings on the roots were superficially somewhat similar to those seen on some of the *Leguminosae*, though less irregular in form than those which leguminous plants often bear. The largest were about $\frac{1}{2}$ inch in length and $\frac{1}{4}$ inch in diameter, and smooth externally. Some of the roots bore several such swellings. . . . A section across a swelling showed one or two small brown areas due to the presence of dead tissue, and from these could be picked out tiny, colourless, globular bodies difficult to discern in the tissues, but easy to see with the naked eye when removed. These proved to be the egg-filled bodies of the 'root-knot' eelworm, *Heterodera radiculicola*. There were no traces of nodule-forming bacteria in the tissues. The nodules had undoubtedly been formed through the attack of the eelworm. . . . Being desirous of obtaining the nodule-forming bacteria from *Clematis*, I communicated with Prof. Cavers in the hope that he would be able to send some of the nodules originally sent to him, but he permits me to say that on re-examination of these nodules, he feels convinced that they, too, were produced by the attack of eelworms, and had no connection with the nodule bacteria of the *Leguminosae*. . . ."

4. Dr. MARJORIE TRIFFITT (*loc. cit.*), in a paper entitled "On the Occurrence of *Heterodera radiculicola* associated with *Heterodera schachtii* as a Field Parasite in Great Britain," describes an infection of Root-Knot Eelworm on field-grown Parsnips and Carrots, which were sent to the Institute of Agricultural Parasitology, St. Albans, in August 1931, by Mr. L. OGILVIE, of the Long Ashton Research Station. The

* *Gardeners' Chronicle*, 1911, vol. xlix, 3rd June, p. 360.

† *Gardeners' Chronicle*, 1911, vol. l, 8th July, p. 7.

infected field, near Bromham (Wiltshire), was divided into a number of small plots on which were grown a variety of market garden crops. Heavy infections of the Potato Eelworm (*H. schachtii*) occurred over most of the surrounding country, and Potatoes had been so unsatisfactory in a portion of the field in question as to be replaced by Carrots. The author describes the signs of attack on Parsnips and Carrots and gives a detailed history of the plants and plots.

Dr. TRIFFITT states: "*H. radicola*, unlike *H. schachtii*, is usually polyphagous in habit, hence it was expected that, of the many varieties of weeds which were growing in the infected plot, a considerable number would show evidences of eelworm attack." A representative collection of weeds was removed and examined in the laboratory, the result of which examination is set out in Table I. Further, it is stated that "a bed of Carrots adjacent to the infected Parsnips showed no signs of infection at the time of the author's visit, but a few small galls were found on Runner Beans and on Mangolds which were growing a few yards distant from the Parsnips, although Lettuce plants which were growing between the rows of Beans were unaffected."

The particular interest in the case of the infected Carrots is that the roots were infected first by the Root-Knot and then by the Potato Eelworms, which is unusual.

Dr. TRIFFITT endeavoured to trace the possible sources of the infection on field crops by *H. marioni*, but was unable to do so to her satisfaction, and suggests the possibility of accidental mechanical transmission of soil which arose either from the boots of labourers, the planting out of infected glasshouse-grown seedlings, or to the use of contaminated Potato bags.

5. Prof. W. BROWN, Imperial College of Science and Technology, South Kensington, has kindly supplied information of an infection of Parsnips which occurred at the Biological Field Station at Slough. He says (letter, April 25, 1936): "Since 1930 I have had a bed sown with Parsnips every year at Slough—in relation to the Canker disease. The same piece of ground has now grown Parsnips each year. I first noted the galls on the side roots in 1932 at one end of the bed, and since then the effect has spread along the bed, which is 15 yards long. GOODEY identified the causal agent for me. It does not affect the roots from the point of view of size or canker, so far as I can see. It tends to make them unusually 'hairy,' but these hairs are easily brushed or rubbed off. Plots nearby which have had Parsnips on them for the last two or three years (with a little bit of rotation) are not yet affected. I remember GOODEY suggesting that the starting point might have been a glasshouse crop, such as Cucumbers. The infected plot is near the greenhouse and the initially infected end is the one nearest the greenhouse door, so that the theory is not at all improbable. Soil from the greenhouse might quite likely have been dumped there."

6. The infection on Flax (*Linum perenne*) was reported in the Ministry of Agriculture's Monthly Summary of Plant Pests, 1933,

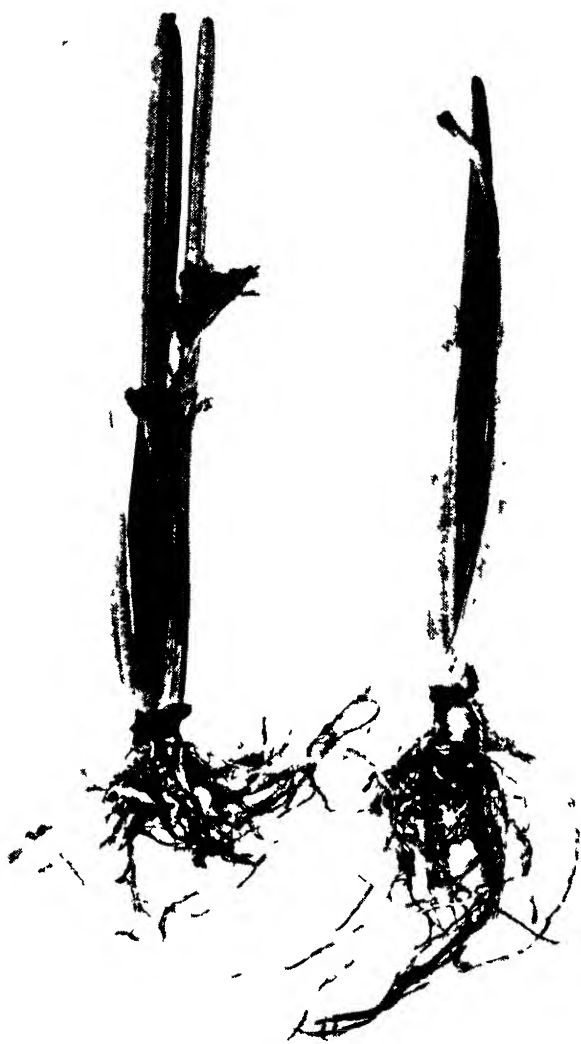


FIG. 91.—CHERRY INFECTED BY ROOT-KNOT DISEASE
(Note small galls.)

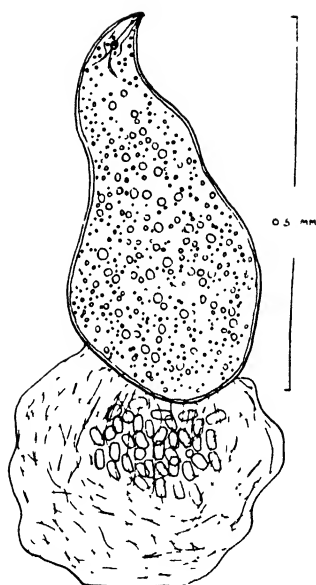


FIG. 95 ROOT-KNOT FELWORM, *HETERODERA MARIONI*.
FEMALE CYST WITH EGG-SAC.
(After Goodey)

[To face p. 341.

No. 1, p. 3. According to the owner of the garden, the plants were growing out-of-doors in a rather dry bed underrun with Elm roots and shaded by a Cedar. The point of interest is that the soil was dry, and this factor is known to be favourable to this Eelworm.

7, 8, and 9. Material of Carrots (fig. 93), Celery (fig. 94), and Pyrethrums (*Chrysanthemum coccineum*) infected with Root-Knot Eelworm was received at Wisley from Bury St. Edmunds, Cork (I.F.S.), and Wisbech respectively. No factors of particular interest concerning the several infections were obtained other than that the plants were growing in gardens and not under open field conditions.

10. Mr. E. E. EDWARDS, M.Sc., kindly informs me (letter, February 22, 1937) that in August 1936 his attention was drawn to a partial failure of spring-sown Carrots on an allotment at Treherbert, Rhondda Valley, Glamorgan. An examination of the roots of unthrifty plants showed that they were heavily infected by *H. marioni* in all stages of development. Further observations revealed that the characteristic root-galls due to this nematode were also present on Carrots grown on neighbouring allotments. In view of the general appearance of the eelworm on the Carrots on a number of allotments a special search was made for its presence on other crops. It soon became evident in this preliminary search that, besides Carrots, Parsnips and Parsley were also subject to infestation but to a lesser degree. The affected Carrot plants were very much stunted, with small roots and the foliage pale in colour. No adverse effects on Parsley and Parsnip could be detected. The original source of the infection remains obscure. There are no glasshouses within many miles, and the land upon which the present allotments are situated was a rough mountain pasture until January 1935.

Host Plants.—The Root-Knot Eelworm is an internal parasite in the roots of a very considerable number of plants and is world-wide in its distribution, being found almost throughout the tropical, sub-tropical and warmer temperate zones.

GOODEY (1933) gives a list of 622 species of plants belonging to 109 Orders. BUHRER and STEINER* have listed 855 host plants in the files of the Bureau of Plant Industry, U.S. Department of Agriculture, Washington, D.C., while GOODEY stated later (1936) that the number of hosts of cultivated and wild plants "now reaches over 1000 names, including many weeds, which in warm countries can serve as reservoir hosts on which the parasite can flourish in the absence of a susceptible crop."

Unlike the Stem Eelworm (*Anguillulina dipsaci*), and the Potato Eelworm (*Heterodera schachtii*), the Root-Knot Eelworm exhibits little or no specialization to particular host plants and, according to GOODEY, appears to be capable of transference from one host to another indiscriminately. Dr. TRIFFITT (*loc. cit.*), in stating the same fact, adds: "The fact that it attacks weeds causes its spread and multiplication to be even more rapid than that of *H. schachtii*, while no crop of economic

* The Plant Disease Reporter, 1933, vol. xvii, 15th June, No. 7, pp. 64-96.

importance in this country is known to be immune to its attack." The italics are ours, in order to stress the importance of the fact that this eelworm appears to feed on any plant available, for such a pronouncement is of considerable importance to growers, who should appreciate that the most stringent methods are necessary to eradicate the pest from infected ground.

BUHRER and STEINER (*loc. cit.*) appear to consider that there is some variation in the reaction of the many host plants to an attack, for while some are tolerant of a heavy infestation, others succumb to a comparatively light attack. It has been known for many years that this eelworm does exhibit a preference for certain hosts—for instance, the principal hosts of the Root-Knot Eelworm under glass-house conditions are Cucumbers and Tomatos.

Description.—The egg, larval and adult stages have been described by GOODEY (1933), and it is necessary here only to describe briefly the different course in the development of the male and female worms.

The adult female has a pear-shaped, glistening white body (fig. 95), which is about the size of a pin's head and can be discerned with the naked eye.

Dimensions.

GOODEY (1933)	0.4–1.3 mm. long	0.27–0.75 mm. wide
	(average, 0.8 mm.)	(average, 0.5 mm.)
from Carrots (No. 7)	0.74 mm.	0.38 mm.

The adult male has a typical eelworm-shaped body and, according to GOODEY (1933), is 1.2–1.5 mm. long, and 0.03–0.36 mm. wide.

Life Cycle.—Each female lays several hundred eggs, which are not retained within the swollen body (cyst) as in the Potato Eelworm (*H. schachtii*), but are laid in a gelatinous mass which is attached to the cyst (fig. 95). Egg laying may be impeded if the female is embedded deeply in the galled tissues of the roots, so that the eggs are then retained partially or completely within the cyst from which they ultimately escape.

The young larvæ, which on hatching are microscopic and worm-like in appearance, invade the roots near the growing point and give rise to a gall in which they develop. The larval eelworms either make their way into the soil and enter new rootlets or (and more especially when they hatch from eggs which are deeply embedded in the galled tissues) penetrate deeper into the tissues, thereby forming fresh centres of infection. All stages of the eelworm may be found in old galled tissue, and development after the first larval stage differs according to the sex of the individual.

Gall Formation and Signs of Attack.—The galls which arise from an infection of this and other species of plant parasitic eelworms have been fully described by GOODEY,* who has studied the pathology and ætiology of plant lesions caused by these pests.* It is frequently

* Imp. Bur. Agric. Parasitology, 1935, pp. 10, 25–26.

stated that the somewhat conspicuous stylet seen in the head region of the parasite is employed for puncturing the cell wall. GOODEY, quoting KOSTOFF and KENDALL, states that the parasite "pours out an irritant secretion, probably from the salivary glands, which has the effect of stimulating an inflow of nutrients into the cells in the vicinity of the parasite's head. These permeate the cell walls and the worm obtains its food by sucking in these substances since . . . there is no evidence of puncturing of the cell wall by the stylet. The great accumulation of nutrients in the cells close to the parasite's head causes them to swell up and they are to be regarded as comparable to the cells of the nutritive core in Cynipid ('gall-wasps') galls. The swelling gives rise to the galled condition. At the same time the inflow of nutrients means their withdrawal from other regions with the consequent checking of the normal processes of plant growth. The parasite gains nourishment at the expense of the plant since the nutrients brought into the affected region to neutralize the irritant substances produced by the parasite permeate the cell walls and are utilized by the worm." Again: "The giant cells with their highly granular contents represent the first reaction on the part of the host tissues since they are formed soon after the invasion of the root."

The infected roots become swollen; the galls varying in size, consistency and shape according to the reaction of the host plant to attack. For instance, while the galls on Celery (fig. 94) and Pyrethrum were small and inconspicuous, those on Carrot (fig. 93) were considerably larger.

The large misshapen root system so frequently observed in infected Tomato plants is due to the coalescing of the galls.

The reduction in the amount of fibrous roots interferes with the normal functions of the root system, so that the aerial portions of the plants are unable to obtain sufficient water and nutrients, with the result that the foliage wilts and becomes yellow, growth is retarded, and complete collapse and death of the plant may follow.

Secondary invasions of the galled roots by bacterial, fungal and other soil organisms may occur, so that wilting and death of the plants is accelerated.

The presence of galls on the roots of non-leguminous plants should be viewed with suspicion, and material suspected of being infected with Root-Knot Eelworm should be submitted to a competent authority for identification.

Dispersal of the Root-Knot Eelworm.—The presence of this eelworm in the open is due principally to the introduction of infected soil from glasshouses as a top dressing to flower borders, vegetable plots and fields, or to transplanting infected seedlings and young plants which have been either potted in infected soil (old compost) or grown in eelworm-infected boxes and pots.

The original attack may be extended by removing infected plants and soil from one part of the garden or field to another, by incorporating infected material from the rubbish heap with the soil, by

garden implements, and by persons walking and working over an infected area.

The overloading of wheelbarrows and farm carts with infected roots and herbaceous material, so that some of the diseased plants drop off during the journey, may frequently be the means of setting up a fresh infection in an area far removed from the original one.

Dr. TRIFFITT (*loc. cit.*) suggests another means of dispersal—namely, bags which have been used for the transport of Spanish and other imported Potatoes which might retain fragments of infected soil.

Weeds, unpulled roots, and "volunteer" plants—that is, cultivated plants which have been left over from one season to another—may be the means whereby the eelworms are carried over from year to year.

Even heavy rains and flood water may be responsible for distributing the eelworms and cysts, which may be carried in surface water.

General Control.—The spread of the Root-Knot Eelworm from glasshouses to the open garden may be avoided if measures are taken to raise the plants in clean, eelworm-free soil, pots and boxes; to grow the seedlings in clean glasshouses and frames; and to refrain from placing infected material on the compost heap and from incorporating infected soil from glasshouses with soil in the open garden.

No practicable measures of sterilizing soil for the purpose of killing eelworms in the open garden are yet known. Some attempt may be made, however, to reduce the amount of eelworm infestation in the open ground by thoroughly watering the soil—after *all* the infected roots have been removed and after the soil has been thoroughly worked to hasten the decay of the smaller roots left behind—with 2 per cent. Formaldehyde (1 gallon of 40 per cent. Formaldehyde to 49 gallons of water). The mixture should be applied to the surface soil by means of a coarse-rose watering-can, and dug in one spit deep immediately after the application has been made.

The utmost care should be taken that soil is not transplanted from an infected area to fresh sites on garden implements, pots and boxes, on the boots of persons walking or working on the soil, or by other means.

Cultural Methods.—Clean cultivation is the essence of prevention, so that attention should be paid to the destruction of weeds by constant hoeing. The importance of weed destruction has been already stressed (see p. 341, "Host Plants").

All plants showing the least sign of infection should be dug up and burned. The complete removal of infected plants with the aid of a fork is specially desirable, so that no part of the underground portion is left in the soil to carry on infection. The tissues of the galled roots form an ideal protection for the eelworm cysts and the larvæ.

With light attacks in the open garden, it is specially desirable to remove completely all infected plants as soon as the presence of the pest is detected, and to dig out the soil from around and beneath the diseased plants and to replace with clean soil.

All diseased roots should be burned—not placed on the rubbish heap.

It is frequently the practice to transplant glasshouse-grown seedlings, e.g. Celery and Clematis, and care should be taken to avoid standing pots or boxes on infected borders in which Cucumbers, Tomatos and other susceptible plants are grown, on account of the danger of particles of infected soil adhering to the plant containers.

The several Physical, Chemical, Biological and Cultural Factors concerned with the control of the Root-Knot Eelworm in tropical crops have recently been considered,* and in relation to cultural practices, LE ROUX and STOFBERG † tested the effects of cultural methods on twenty small plots of infected land (20 feet by 30 feet each).

The measures adopted were as follows :

- (i) Planted with susceptible crops.
- (ii) Unplanted and kept free from weeds by hoeing and ploughing.
- (iii) Planted with resistant crops.
- (iv) Unplanted and unweeded.
- (v) Unplanted but kept free from weeds by hoeing.

Tomatos were grown after a period of eleven months on all the plots, with the result that Plot No. (ii)—fallow ground kept clean by hoeing and ploughing—was the most satisfactory, while some means of control was given by the methods adopted on Plots (iii) and (v).

It is seldom possible, however, under the conditions of intensive cultivation practised in our gardens and fields, to permit ground to remain fallow for a prolonged period in order to starve out the eelworms. Clean cultivation by hoeing is possible, and by this operation weed hosts are destroyed. Overcrowding should be avoided, to provide abundant light and air so that the plants may be grown under the most favourable conditions possible in order to reduce the degree of infection by this eelworm.

Manurial Treatment of Infected Soil.—That there is danger from introducing eelworms into gardens in decaying organic matter, old potting compost and soil from glasshouse borders, and in farmyard manure, should be borne in mind.

Soil from infected glasshouse borders should either be discarded and buried *deeply* in some odd corner of the garden, or subjected to steam sterilization, and should on no account be used either as a top dressing or incorporated with the soil of outside borders.

While it is known that artificial fertilizers cannot be depended upon to support plants against infestation by eelworms, yet plants withstand infection to a greater degree when they are supplied with a well-balanced and stimulating organic manure.

Heavy dressings of farmyard manure and of well-decayed plant refuse should be avoided on infected ground, for both are somewhat

* Imp. Bur. Agric. Parasitology, Notes and Mem. No. 11, 1936, 6 pp.

† Farming in S. Africa, 1935, vol. x, pp. 150-154.

retentive of moisture and tend to predispose the plants to secondary infections by bacterial and fungal organisms.

The use of Mustard as a green crop in limiting effectively the infection of Potatoes by *Heterodera schachtii* has been recorded by Dr. TRIFFITT,* who has proved that the reduction in eelworm attack is not due solely to the increased organic content of the soil by substituting other organic matter for the Mustard seedlings. It is considered that some constituent of the Mustard plant which checks the eelworm at some period of its life history must be released by the decomposing plants. The effect of Mustard as a green crop on land infected with Root-Knot Eelworm is not known, but the success obtained on land infected with the Potato Eelworm would suggest the possibilities of growing Mustard as a green manure on land infected with *H. marioni*.

Rotation of Crops.—The ideal method of eradicating plant parasitic eelworms from soil is to starve them out, and the most satisfactory practicable measure to be adopted in the case of the Stem Eelworm (*Anguillulina dipsaci*) is to follow on an infected crop with one that is not attractive to the particular race of eelworm present in the soil.

It has already been stated that the Root-Knot Eelworm exhibits little or no specialization to particular hosts, and that it appears to be capable of transference from one host to another indiscriminately. This factor of elasticity in feeding habits makes it difficult to eradicate completely this eelworm by growing plants resistant to attack, though work along these lines has been carried on in the United States and elsewhere during the past few years.

The method of controlling infestations of Root-Knot Eelworm in ground under perennial crops is unknown at present, and it behoves the grower to observe his plants carefully and to take early measures to stamp out the pest at its first appearance in the open garden by following out the recommendations made, thereby preventing widespread infection of his soil.

Acknowledgments.—I desire to express my sincere thanks to Dr. T. GOODEY for the vast amount of help he has supplied in the matter of data relating to infections of plants grown under open conditions in this country and on the Continent, and for allowing me access to personal correspondence and to literature. My thanks are due also to Prof. W. BROWN, D.Sc., Mr. F. J. CHITTENDEN, V.M.H., Mr. E. E. EDWARDS, M.Sc., Mr. A. HOSKING, and Dr. MARJORIE TRIFFITT, for detailed information concerning infections of plants by the Root-Knot Eelworm in this country; and to my colleagues Mr. N. K. GOULD for kindly making translations from German literature, and Mr. F. C. BROWN for the photographs illustrating this paper.

* Journ. Helminthology, 1929, vol. vii, pp. 81-92.

THE FLORA OF CHINA : EARLY INVESTIGATIONS.

By F. C. STERN, F.L.S.

AMONG the treasures of the Lindley Library at Vincent Square is a volume entitled History of European Botanical Discoveries in China, by E. BRETSCHNEIDER.

The first thing that strikes one about this book on the flora of China, is that it is written by a Russian Lithuanian in English, and printed at the Russian Press in St. Petersburg. It is a large book of 1000 pages containing the most careful and detailed histories of all the European botanists and travellers who have collected plants in the fields and mountains of China from the time of MARCO POLO to the year of publication, 1898.

This book is of absorbing interest to gardeners, and especially to those who have raised "new" plants from China during the last thirty years. Someone must write some day another volume describing the travels of the great collectors of the twentieth century: WILSON, FORREST, PURDOM, FARRER, HANDEL-MAZETTI, MEYER, ROCK, and KINGDON WARD. It is interesting to know the stories of the plants that grow in the garden and of the way they got there.

MARCO POLO, who lived in the thirteenth century, made a historic journey to China from Venice overland. He lived many years in China, but, as far as one knows, he only interested himself in the economic plants of that country. He is said to have brought back the roots of the medicinal rhubarb.

After MARCO POLO, there is a gap of some 300 years till the Catholic missionaries first arrived in China, at the end of the sixteenth century. MATTHAEUS RICCI was the first missionary to reside at Peking in the year 1600. These missionaries were more interested in economic plants than in plants for the garden or the herbarium. In later years, as we shall see, the finest collections of the Chinese flora were made by French Catholic missionaries whose names are familiar as household words to every modern gardener.

DOMINICUS PARENIN first mentions *Wistaria chinensis* in his letters home in 1698. Every gardener knows the name of Father PIERRE D'INCARVILLE and the genus called after him, but few gardeners know that he sent home in 1743 to the Paris Museum of Natural History dried specimens of *Viburnum fragrans* and *Syringa villosa*, two very "new" plants from the garden point of view. The seeds sent home by PURDOM and FARRER in 1913 and 1914 made *Viburnum fragrans* easy to obtain for the garden; the seed of *Syringa villosa* was sent home by WILSON. D'INCARVILLE was probably the first botanical collector in China.

Nearly a hundred years passed to 1816, when Dr. ABEL accompanied Lord AMHERST on his journey when he was appointed British Ambassador to the Court of Peking. It was an exciting and adventurous journey and made doubly so for Dr. ABEL, a real lover of plants. He describes the journey by the flowers and trees along the way, and botanized while the Imperial Commissioners conferred with Lord AMHERST about the question of the Ambassador's prostration before the Emperor, a course which naturally Lord AMHERST refused to accept. Dr. ABEL had bad luck in losing his botanical specimens in a shipwreck on his way home, but had some compensation by an interview with NAPOLEON at St. Helena, where they landed. The genus *Abelia*, named after this adventurous doctor, will always keep his memory green.

The Royal Horticultural Society, which was founded in 1804, began to endeavour to obtain some of the horticultural riches of China for English gardens; Dr. LINDLEY, the well-known secretary to the Society of that time, wrote: "One of the many objects which occupy the Horticultural Society is the introduction of ornamental plants to the gardens of the country and the free distribution of them when procured."

A member of the Society, JOHN REEVES, lived at Canton, and it was through him that the Society was able to introduce to English gardens between 1812 and 1830 living plants of *Wistaria*, Tree *Pæonies*, Chinese *Azaleas*, *Camellias*, *Chrysanthemums*, *Roses* and other horticultural treasures. The original *Wistaria chinensis* was planted in the Society's garden at Chiswick in 1818, and in 1839, according to the Botanical Register of 1840, this plant produced 675,000 flowers! Did they count every flower of each raceme or did the printer become enthusiastic with his noughts and add a few for luck? JOHN REEVES sent home to the Society a collection of flower paintings done by Chinese artists under his direction, which can be seen at the present time in the Lindley Library at Vincent Square.

The first tree *Pæony* was introduced to Kew in 1787 from Canton by the exertions of that great scientist and energetic friend of horticulture, Sir JOSEPH BANKS. Sir A. HUME of Wormley Bury, Herts (now the home of another enthusiastic gardener, Major PAM), imported a tree *Pæony* in 1802, and in 1835 it is said to have been 7 feet high and 14 feet in diameter, bearing 320 flowers.

During these years at the beginning of the nineteenth century, there were several collectors at work on the outskirts of China. JOHN POTTS, gardener to the Horticultural Society, was sent out by the Society in 1821 and brought home among many other plants *Paeonia albiflora* var. *Pottsii*. Dr. LIVINGSTONE, of the East India Company's service, became a correspondent of the Society and discovered *Illicium religiosum* to be a native of China, though later introduced from Japan. In about 1830, Prof. MEYEN of Berlin discovered *Clematis Meyeniana*. A young Cossack named KUZNETZO collected in Kansu, where FARRER afterwards collected, in about 1830 for the

Russian botanist TURCZANINOV. From here he sent to St. Petersburg specimens of *Clematis macrosepala* and *Carpinus Turczaninowii*, both sent home by FARRER in 1913. *Buddleia alternifolia*, another of FARRER's plants, was first found in 1875 by Dr. PIASETSKI in Kansu on a Russian Government expedition.

In 1843 the Horticultural Society sent out ROBERT FORTUNE from their gardens at Chiswick to China to collect plants. He spent about eighteen years in China and Japan, but, after the first expedition, worked for the East India Company. Economic plants then interested him most. FORTUNE sent home to the Society many plants from the nurseries and gardens of China, such as tree Pæonies and Camellias, and also *Chimonanthus fragrans* and *Anemone japonica*. After FORTUNE had left the service of the Royal Horticultural Society, he sent home horticultural plants and seeds to two nurserymen, Messrs. STANDISH and NOBLE of Sunningdale and Messrs. GLENDINNING of Chiswick.

In the next decade collecting began on a bigger scale, mainly by the French Catholic missionaries and by Russian botanists and an Englishman, Dr. HANCE, who was a civil servant in the British colony of Hong Kong. Dr. HANCE lived at Hong Kong and Canton from 1844 until his death in 1888. He was a keen amateur botanist and correspondent of Kew, and encouraged all the Europeans in China to collect dried specimens for him.

One of the first French missionaries to collect plants was PAUL PERNY, whose best known find was *Ilex PERNYi*. He lived in China between the years 1850 and 1860. Father ARMAND DAVID, a name famous among botanical explorers, arrived in Pekin in 1862. He made three wonderful journeys: the first in 1866 to Southern Mongolia, when he found *Prunus Davidiana*, *Caryopteris mongolica*, *Rosa xanthina* and *Xanthoceras sorbifolia*, though the last two were well known in the gardens of Pekin. On this expedition, DAVID reports that he found wild silkworms living on wild mulberry trees. His second expedition, which was even more ambitious, was to Western China and Tibet. He travelled up the Yang-Tze river to the province of Kiangsi, where he found *Cryptomeria japonica*, *Melia Azedarach*, and *Acacia Julibrissin*, among many other plants, then pushing on up the river to Chungking, across to Chengtu, the capital of Szechwan. Here in the mountains of Muping he first met large tree Rhododendrons and discovered the new genus called after him, *Davidia*, and the new Liliaceous genus *Nomocharis*, as well as *Lilium Davidi* and *L. Duchartrei*. After two years his health began to fail and he returned to Shanghai. In 1872 he made another great expedition to the mountains of the West and the province of Shensi which lasted two years. He collected on these three expeditions 1577 species, of which 243 were new to science. Besides the plants mentioned above, he collected *Clematis Armandi*, *Acer Davidi*, *Stranvaesia Davidiana* and many other well-known garden plants, and such Rhododendrons as *Rhododendron calophyllum*, *R. decorum*, *R. lutescens* and *R. moupinense*.

After these expeditions, Father DAVID returned to France, where he met another missionary, Father JEAN MARIE DELAVAY, whom he encouraged to go out and continue his work. Father DELAVAY became an apt pupil and an indefatigable collector. He collected over 200,000 specimens comprising some 4,000 species. He was first sent to the province of Yunnan, where he collected, and then on to the provinces of Hupeh and Szechwan. He spent ten years north and north-east of the great lake of Tali in Yunnan, going as far as the Likiang range. In 1888 he contracted plague and was partly paralysed. He returned to Yunnan in 1893, when he continued to collect, dying in harness, so to speak, in 1895. DELAVAY discovered more new plants suitable to the gardens of temperate climates than probably any other one man and was the pioneer who showed the way to the great collectors of this century. Here are a few of the plants which are named after him, and are now famous as garden plants: *Paeonia Delavayi*, *Magnolia Delavayi*, *Cyananthus Delavayi*, *Rhododendron Delavayi*, *Clethra Delavayi*, *Omphalogramma Delavayi*, *Osmanthus Delavayi*, *Iris Delavayi* and *Incarvillea Delavayi*, an interesting name commemorating two great French missionaries. The magnificent plants he collected are legion. It is somehow surprising to find that he first discovered and sent home specimens of *Meconopsis betonicifolia*, *Primula malacoides*, *P. nutans*, *Rhododendron bullatum*, *R. racemosum* and *Nomocharis pardanthinum*. He collected thirty-two species of Gentian and six new species of Liliun. A whole list of plants may be found in BRETSCHEIDER, and it covers many pages. The dried specimens and also seeds of some species were sent back by him to the Museum of Natural History in Paris. The specimens are in perfect condition and carefully labelled by DELAVAY, who wrote in one of his letters: "Toutes les plantes que j'ai envoyées à Paris ont été recoltées par moi. J'employais quelques Chinois pour m'accompagner dans les excursions et m'aider." Gardeners will ever remember Father DELAVAY, who devoted the spare time of his life to the discovery and collection of so many beautiful plants that now adorn the gardens of the world.

Another French missionary, JEAN ANDRE SOULIÉ, was quartered at Tatsienlu and sent home many botanical specimens. He sent home in 1893 seed of *Buddleia Davidi*. This plant first flowered in Europe in 1894 and it has already become a weed, though one of the prettiest flowering shrubs of our gardens. Another missionary, PAUL FARGES, collected in 1892 in north-east Szechwan. *Clematis Fargesii* and *Paulownia Fargesii* are named after him, as well as *Rhododendron Fargesii*; *R. discolor* and *R. sutchuenense* were found by him.

The mouth of the Amur river was only discovered by the Russians in 1849. After that date, the Russian botanists began to extend their activities to this district and the northern parts of China. C. MAXIMOWICZ, a young man in charge of the herbarium at St. Petersburg, was sent to explore the new Amur country for botanical specimens. He made two expeditions, in 1854 and 1859, and sent back among other plants *Actinidia Kolomikta* and *Lilium tenuifolium*. In 1860 he went

to collect in Japan and sent home *Acer nikoense* and *Magnolia stellata* and would have, no doubt, introduced all the Japanese Lilies, but unfortunately his collection of Liliaceous plants was eaten by pigs ! Professor MAACK, of the University of Irkutsk, introduced in 1855 that delightful Bird Cherry with the golden bark, *Prunus Maackii*, and Baron ALEX VON SCHLIPPENBACH collected the Rhododendron called after him. NICOLAI PRZEWALSKI, a Russian Staff Officer, was perhaps the most energetic and successful of all the Russian explorers. He started in 1869 in Eastern Siberia, then went to Southern Mongolia, to Kansu and on to the Tianshan and Northern Tibet and across the Gobi Desert. He died while still travelling in 1888. He found and introduced by seed to the Botanical Gardens at St. Petersburg many of the plants afterwards again introduced by FARRER, such as *Meconopsis quintuplinervia*, *Aquilegia ecalcarata*, *Caryopteris tangutica* and many others, and also *Gentiana Kurroo* var. *brevidens*.

Another great Russian explorer was GREGORE POTANIN, who travelled in Central Asia, then on to Kansu, where he found *Deutzia albida* and *Gentiana hexaphylla*, and between Tatsienlu and Batang on the highway between Tibet and China he found *Prunus Puddum* var. *tibetica*. Can this be the Carmine Cherry found by KINGDON WARD on one of his last expeditions ?

During these years, British officers of the Consular service and those serving in the Chinese Customs also collected plants and specimens, mainly owing to encouragement by Dr. HANCE. THOMAS WATTERS collected *Sophora viciifolia* and *Viburnum utile*, and W. HANCOCK collected *Jasminum primulinum*. WILLIAM CARLES collected in 1867 the charming *Viburnum* called after him. The strangest figure of all Dr. HANCE's collectors was WILLIAM MENSY, a native of Jersey, who became a Major-General in the Chinese Imperial Army.

The most successful British collector was Dr. AUGUSTINE HENRY, who served in the Chinese Customs. In 1881 he was sent to Ichang in the province of Hupeh, and there opened up an entirely new country from a botanical point of view. He also travelled in Szechwan, where he saw *Davidia involucreata*, and in 1896 he travelled in Southern Yunnan. His collections numbered 500 new species and 25 new genera. Some of his more famous discoveries were *Tetracentron sinensis*, *Vitis Henryana*, *Staphylea holocarpa*, *Cercis racemosa*, *Viburnum Henryi*, *V. rhytidophyllum*, *Rhododendron Augustinii* and *R. auriculatum*, and *Emmenopterys Henryi*, which, though afterwards introduced by WILSON, some thirty years ago, has never yet flowered in cultivation.

In 1889 A. E. PRATT, an English naturalist, made a journey to Tatsienlu, a place well known to all those who study the herbarium material of Western China. This place appears to be the centre of a paradise of hardy Rhododendrons, Primulas and other treasures. Here PRATT collected *Neillia longiracemosa*, *Primula Cockburniana* and *Gentiana trichotoma* among others.

This is a brief story of the intrepid pioneers who first discovered the wonderful flora of China.

SPECIES OF CAMELLIA IN CULTIVATION.

By J. R. SEALY, B.Sc.

It is now almost two hundred years since a species of *Camellia* was first introduced into cultivation in this country—the earliest record we have being that *Camellia japonica* was grown by ROBERT JAMES, Lord PETRE, in 1739—but how long this and other species have been cultivated in Chinese and Japanese gardens we cannot say: they have apparently been grown from the earliest times.

The introduction of *C. japonica* was followed by that of the tea-plant (*C. sinensis*) in 1768. Then, in the early part of the nineteenth century, several more species reached this country, namely, *C. reticulata*, *C. oleifera*, *C. maliflora* and *C. euryoides*, whilst the *C. rosiflora* figured and described by HOOKER in 1858 may have arrived with them, for its origin was quite unknown to HOOKER and remains obscure to this day. Of the species mentioned, *C. oleifera*, *C. euryoides* and *C. rosiflora* seem to be no longer in cultivation, and the continuance of *C. maliflora* was not known until 1935, when a plant growing at Kew, under the name *C. rosiflora flore pleno*, was critically examined and found to be actually *C. maliflora*. The next species to come into cultivation in Europe was *C. Sasanqua*, which was introduced into France about 1869 and into this country ten years later, whilst in 1874 *C. hongkongensis* was introduced for the first time into the Royal Botanic Gardens at Kew. Two other species have come into our gardens in more recent years: *C. cuspidata*, introduced at the beginning of the present century, and *C. saluenensis*, which is a FORREST introduction of quite recent date.

As has already been indicated, there has been some confusion between *C. maliflora* and *C. rosiflora*, and there seems also to be some doubt concerning the distinctness of *C. Sasanqua* and its very close relative *C. oleifera*, whilst *C. saluenensis* has been involved in a great deal of confusion and its identity is evidently by no means clear. In the present article it is proposed to give the results of investigations that have been made into the matters in dispute, and to bring together notes that have been made from time to time regarding the history and identity of the garden plants. Before going any further, however, it is necessary to say something about the name of the genus.

It is now well known that the genera *Thea* and *Camellia* are no longer kept distinct from one another. They have been united by botanists since about the middle of the last century, but the generic name used when the two genera were united depended on the botanist concerned, some using *Thea* and others using *Camellia*. The difficulty

arose from the fact that both *Thea* and *Camellia* date from 1753,* and various arguments were propounded in favour of one or the other of the two names. In 1916, however, the matter appeared to be settled by COHEN-STUART, who pointed out (in *Meded. Proefst. Voor Thee*, XL. 69 : 1916 ; account in English in *Bull. Jard. Bot. Buitenzorg*, Ser. 3, I, 241 : 1919) that the first person to unite the two genera was ROBERT SWEET in his *Hortus Suburbanus Londinensis*, 157 (1818), and that since SWEET chose to use the name *Camellia* for the combined genera, then, in accordance with the International Rules of Botanical Nomenclature, *Camellia* was the correct name. It is true that *Thea* appeared on p. 515 of the *Species Plantarum*, which is in Volume I, and that *Camellia* appeared on p. 698, which is in Volume II—the pagination of the two volumes being continuous—but there was no reason to suspect that one volume appeared before the other, and for the purposes of the International Rules the two genera were to be taken as published at the same date, the first person to unite them being allowed to choose the name. In 1923, however, an article by Dr. DAYDON JACKSON was published in the *Journal of Botany*, LXI, 174, in which he showed that whereas Volume I of the *Species Plantarum* appeared in May 1753, Volume II was not published until August of that year. In the light of this new information REHDER pointed out (*Journ. Arn. Arb.* V, 238 : 1924) that as *Thea* was in Volume I and *Camellia* was in Volume II, "... *Thea* has clearly the priority of *Camellia*." This conclusion was formally correct according to the Rules, and so *Thea* came into use as the generic name and superseded *Camellia*. The matter did not rest there, however, for at the Sixth International Botanical Congress, held at Amsterdam in 1935, it was decided that for the purpose of botanical nomenclature the two volumes of LINNAEUS' *Species Plantarum* should be treated as having been published together, so that the argument that *Thea* has priority over *Camellia* no longer holds good. Consequently when these two genera are united the correct name for the resulting genus is *Camellia*.

There is no need to discuss here the reasons for uniting the two genera *Thea* and *Camellia*, nor is there any need to give an account of the sections into which the species of the genus have been grouped. For our purpose it is sufficient to say that, with the exception of *C. hongkongensis*, the species in cultivation fall into two groups which roughly correspond to the original genera *Thea* and *Camellia*. LINNAEUS had only one species in each of these genera at first, namely *Camellia japonica* and *Thea sinensis* respectively, and the differences between them, apparent to anybody who cares to examine a flower of each, can be summarized thus :

* From the first edition of LINNAEUS' *Species Plantarum*, 1753. No generic descriptions appear in this work, but for the purposes of botanical nomenclature it has been agreed that the descriptions of genera published in LINNAEUS' *Genera Plantarum* Ed. 5 (1754), shall be associated with the names published in the *Species Plantarum* and that the date shall be taken as 1753, this being the starting point for botanical nomenclature of the flowering plants.

Camellia japonica: flower sessile; flower-bud elliptic-ovoid, large, 1.5-2 cm. long and about 1 cm. in diameter, protected by a series of scales which become progressively larger upwards, the outermost hard and brownish, the innermost showing transitions to the petals; there is no clearly defined calyx, the uppermost bud-scales, which correspond to the sepals, are not sharply marked off from the other bud-scales which correspond to bracts; bud-scales falling off early, often before the petals, but in any case before the fruit is developed, so that the fruit is left seated on a very short, naked, much-scarred stalk.

Camellia (Thea) sinensis: flower shortly stalked; stalk green, bearing a number of small greenish bracts which fall early or may persist for some time; flower-bud globose, small, about 5 mm. in diameter just before opening, protected chiefly by the well-defined calyx of five green sepals which always persist, so that even ripe fruits will be found to be supported by the five sepals.

Of the species of *Camellia* under review, *C. Sasanqua*, *C. reticulata* and *C. saluenensis* belong to the *C. japonica* type, whilst *C. maliflora* and *C. cuspidata* are essentially similar to *C. sinensis*. *C. hongkongensis* stands somewhat apart, since, although the bud-scales are like those described for *C. japonica*, they are nevertheless persistent in fruit.

KEY TO THE SPECIES IN CULTIVATION.

Whilst the flowers furnish the most important characters for discriminating the species and are primarily used in this key, yet each species can, on acquaintance, be distinguished by its leaves. Brief descriptions of the latter are therefore given, and may be found useful for identifying plants not in flower.

(A) Flower borne on a short green stalk; flower-buds globose, small, about 5 mm. in diameter just before opening; sepals and bracts green, sepals 5-7, not exceeding 6 mm. in length, distinguishable from the bracts, persistent in fruit.

(B) Flowers single, about 3 cm. in diameter; petals white.

(C) Flowers nodding, borne on stalks which are about 1 cm. long, and which bear a few small distant bracts that soon fall off; ovary hairy.

Leaves leathery, very variable in size and shape, acute to acuminate at the apex, margins crenulate.

1. *C. sinensis* (p. 355).

(CC) Flowers erect-spreading, borne on very short stalks which are covered by a number of small closely imbricate persistent bracts; ovary glabrous.

Leaves leathery; blades mostly 3.5-7.5 cm. by 1.5-2.5 cm., sometimes to 9 cm. by 3 cm., lanceolate to elliptic from a rounded base, long-acuminate to caudate at the apex, margins serrulate.

2. *C. cuspidata* (p. 356).

(BB) Flowers double, 3.5-4 cm. in diameter; petals flushed with rose.

Leaves thinly leathery; blades mostly 3.7-5 cm. by 1.8-3 cm., elliptic-oblong to oval from a broad cuneate to rounded base, apex shortly acuminate, margins minutely serrulate.

3. *C. maliflora* (p. 357).

- (AA) Flower sessile; flower-buds elliptic-ovoid, large, 1.5-2 cm. long and about 1 cm. in diameter just before opening; bracts and sepals forming a single series of bud-scales, the outermost hard and brownish, the innermost thin and herbaceous or petaloid, and 1.5-2 cm. long, sepals not distinguishable from the bracts, usually early deciduous, persistent in fruit only in *C. hongkongensis*.

- (D) Flower-bud-scales persistent in fruit.

Leaves coriaceous; blades mostly 9-12 cm. by 2.7-3.7 cm., narrow oblong, apex acuminate, very dark green above, margins entire or very minutely crenulate.

4. *C. hongkongensis* (p. 358).

- (DD) Flower-bud-scales deciduous, fruit borne on a very short naked much-scarred stalk.

Leaf-blades less than 9 cm. long except in *C. reticulata*, where, however, they are broader, being 9-11 cm. by 3.5-5.5 cm., more or less elliptic, margins distinctly crenulate or serrulate.

- (E) Ovary glabrous.

Leaves rigidly coriaceous; blades mostly 6.5-8 cm. by 3-4 cm., broad oval, apex shortly acuminate with the tip blunt, blackish shining green above, bright green below, margins crenulate.

5. *C. japonica* (p. 359).

- (EE) Ovary densely white-hairy.

- (F) Petals free to the base; stamens about 1.5 cm. long, united for up to 4 mm. at the base; styles 9-12 mm. long.

Leaves thinly leathery; blades mostly 3-4.5 cm. by 1.5-2 cm. in wild specimens, up to 7 cm. long and 3 cm. wide in cultivated plants, oblong-elliptic to broad elliptic, apex obtuse, margins crenulate.

6. *C. Sasanqua* (p. 360).

- (FF) Petals united among themselves and to the stamens for 1 cm. or more at the base; stamens 2-4 cm. long, united for half to nearly the whole of their length; styles 1.5-3.2 cm. long.

Leaves with margins regularly and closely serrulate.

- (G) Flowers 9 cm. or more in diameter; petals about 5.2 cm. long; stamens 3-4 cm. long; styles 2.5-3.2 cm. long.

Leaves rigidly coriaceous, mostly 9-11 cm. by 3.5-4.8 (sometimes 5.5) cm., broadly elliptic, apex acuminate, dull green (matt) above, bright light green below, venation visible.

7. *C. reticulata* (p. 362).

- (GG) Flowers up to 7 cm. in diameter; petals 3-4 cm. long; stamens up to 3 cm. long; styles 2-2.7 cm. long.

Leaves coriaceous; blades mostly 3.5-4.5 cm. by 1.3-1.8 cm. in wild specimens, up to 7 cm. long and 4 cm. wide in cultivated plants, oblong or oblong-elliptic, apex obtuse, more rarely acute, bright dark green and shining above, bright light green below, venation obscure.

8. *C. saluenensis* (p. 363).

Notes concerning these species follow, the species being dealt with in the order in which they appear in the key.

1. *Camellia sinensis*.—This, the tea-plant, was first described by LINNÆUS as *Thea sinensis*, and the correct name for it, now that the genus *Thea* is united with *Camellia*, is *Camellia sinensis* (L.) O. Kuntze. In gardens it is still commonly found under one or other of its numerous synonyms, the commonest being *C. theifera*, *C. Thea*, *C. Bohea* and *C. viridis*. It seems to have been introduced into this country by JOHN ELLIS in 1768, and quickly to have become widespread in cultivation. Although plants in flower are quite pleasing with their numerous

white flowers set against the background of the dark leaves, and although a certain amount of interest is attached to the species since it is the source of tea, yet plants of *C. sinensis* cannot claim to be of much decorative value compared with other species in the genus. They can be grown out of doors, but require some shelter, and are seen at their best when grown in a cool greenhouse.

It is stated that tea-drinking was a custom in China before the Christian era, and there seems to be no doubt that the tea-plant has been widely cultivated in China for many centuries. Now, of course, it is grown all over south-east Asia and in other parts of the world, and its "varieties" are innumerable. Almost as soon as the tea-plant became known to European botanists, controversies arose as to whether the different sorts of tea-plant represented different species or were merely variations of one species. In the very early days discussion centred round the question as to whether the "black tea" (*Thea Bohea* L.) was a different species from the "green tea" (*Thea viridis* L.) or whether they were varieties of one species; we now know that any tea-plant will yield black tea or green tea according to the process to which the leaves are subjected. Later on the question as to whether the Indian tea-plants were different from the Chinese, and problems connected with the classification of, and status that was to be accorded to, the different types of tea-plant engaged the attention of botanists and tea-growers alike, but it is now generally conceded that all the forms should be included within the limits of one species, *Camellia sinensis*. Another problem that has long perplexed botanists is that of the origin of the tea-plant; to this day there is no really satisfactory record of its occurrence in a truly wild state, which is not altogether surprising when one remembers its antiquity as a cultivated plant, and its origin remains obscure. For further particulars concerning the tea-plant, the reader should consult the paper by COHEN-STUART in the *Bulletin du Jardin Botanique de Buitenzorg*, sér. 3, I, 248-280 (1919), this being an English version of the more general part of the same author's earlier paper "Selektie de Thee."

2. *Camellia cuspidata*.—This species appears to be a very common plant of the thickets and thin woods in the province of Hupeh, China, and it is also recorded from Wushan, eastern Szechwan (just over the border from Hupeh), and from the provinces of Anhwei and Chekiang. First collected in 1877 near Ichang, Hupeh, by AUGUSTINE HENRY, it was subsequently obtained in the same district in 1900 by E. H. WILSON (No. 8) during his expedition for Messrs. VEITCH. The species was described in 1900 as *Thea cuspidata* by KOCHS from HENRY's specimens, and was introduced into cultivation in this country by means of seeds sent home by WILSON. Plants raised by Messrs. VEITCH flowered in 1912 and were shown at a meeting of the Royal Horticultural Society on April 2 of that year, when an Award of Merit was given to the species. It was figured in the *Botanical Magazine*, t. 9277, in 1932.

Among the species in cultivation *C. cuspidata* is easily recognizable by its narrow, long-acuminate to caudate leaves, which, in conjunction with the slender branches, give the plants quite an elegant appearance. Plants have proved hardy in the open at Kew, and produce their small white flowers very freely from March to April, though, as Mr. BEAN has pointed out, the flowers may be injured by strong winds or cold.

3. *Camellia maliflora*.—This beautiful double-flowered species was originally introduced into this country from China in 1818 by Capt. RAWES, and was no doubt obtained from a Chinese garden. For some years it passed as a variety of *C. Sasanqua*, and as such it was figured in the Botanical Magazine, t. 2080 (1819), in the Botanical Register, t. 547 (1821), and elsewhere. In 1827 LINDLEY (in Bot. Reg. sub t. 1078) recognized it as a distinct species and named it *C. maliflora*. SEEMANN (in Trans. Linn. Soc., London, XXII, 346 : 1859) suggested it was a double-flowered state of the *C. rosiflora* which HOOKER had described and figured during the previous year in the Botanical Magazine, t. 5044. SEEMANN placed it in the genus *Thea*, which he regarded as distinct from *Camellia*, but he was careful to use the older epithet *maliflora*, and called the species *Thea maliflora*, distinguishing the original double-flowered state as "var. *flore pleno* Seem." Later on, however, the epithet *rosiflora* came into use, and our plant became known as *C. rosiflora flore pleno*, under which name plants were grown at Kew until 1935. In that year Mr. COUTTS drew my attention to the plants, pointing out that they exhibited considerable differences from *C. rosiflora* as figured in the Botanical Magazine, and upon examination it at once became apparent that the Kew plants were identical with LINDLEY's original *C. maliflora* and agreed perfectly with the figures of that species. The relationship of *C. maliflora* to *C. rosiflora* is very problematical. The latter was described by HOOKER from a plant of unknown origin that had long been grown at Kew under the incorrect name of *C. euryoides* Lindl.—a very different species. It is no longer in cultivation at Kew, and our knowledge of it rests solely on HOOKER's account and figure and on the specimens of it which he preserved and which are now in the Kew Herbarium. Comparison of the figures and descriptions of *C. rosiflora* with those of *C. maliflora* shows at once that, apart from the flowers, the former has larger, thicker and longer stalked leaves whose apices are longer and more caudate, and whose margins are more prominently and more coarsely serrate than those of the latter, and these differences are also apparent from the specimens. In other characters, such as shape of leaf, the thin hairy twigs, etc., there is little or no difference between the two plants, whilst wild specimens of a single-flowered plant from China, though mostly agreeing better in size of leaf with *C. maliflora* than with *C. rosiflora*, yet approach the latter in the rather longer apices and somewhat more pronounced serration. In two specimens (Henry 3374 and Wilson Arn. Arb. Exped. 2207) the leaves are actually more like those of *C. rosiflora* in size also, although

it should be noticed that they have the distinctly shorter petioles of *C. maliflora*. These field-specimens * all come from the province of Hupeh and evidently represent a single species, from which it is possible that the original double-flowered *C. maliflora* and the single-flowered *C. rosiflora* may both have arisen in cultivation.

Whatever the origin of *C. maliflora*, there is no doubt that the double-flowered plant in cultivation at Kew to-day is identical with the plant introduced by Capt. RAWES in 1818, and in all probability the Kew plants are descendants from the original introduction, for nothing is now known of their history. It is not known if this *Camellia* has survived in gardens elsewhere, but it is certainly worth growing as a cool greenhouse shrub, and is hardy enough to grow out of doors if given a little protection. At Kew it is seen at its best in the Conservatory and in the Temperate House, and makes a shapely bush some eight feet high and about six feet through, flowering profusely from January to March. The small, neat, thinly leathery leaves, dark green above and bright green below, set off to advantage the beautiful blush-pink flowers, which, though double, are quite dainty. The petals are not shed when the flowers are over, but the flower, including its short stalk, falls off as a whole.

4. *Camellia hongkongensis*.—This species was first described and figured by SEEMANN (in Trans. Linn. Soc. London, XXII, 342, t. 60: 1859), who stated that it was discovered by GAUDICHAUD in "Cochinchina—Tourane" (presumably Tourane in Annam, 16° 8' N., 108° 19' E.) in January 1837, and was subsequently found by Lt.-Col. EYRE in Hongkong about 1849. Since then it has been collected on many occasions in Hongkong, and though SEEMANN stated that only three trees were known to exist on the island, DUNN and TUTCHER (in Kew Bull. Add. Ser. X, 46: 1912) give the distribution of the plant as Happy Valley and Little Hongkong woods at Taitam, Mt. Victoria, and Mt. Kellat, so that one presumes it is more abundant in Hongkong than SEEMANN supposed.

The species was first mentioned in literature by Major CHAMPION, who collected specimens in Hongkong during his sojourn there from 1847 to 1850, and who thought that the plant was a wild form of *C. japonica*. As SEEMANN pointed out, however, the shape of its leaves and its hairy ovary distinguish it at once from *C. japonica*, and to this we can add that the bud-scales are persistent in fruit in the Hongkong plant, whereas in *C. japonica* they are early deciduous.

Plants and seeds of *C. hongkongensis* were received at Kew towards the end of 1936 from Mr. H. GREEN, Superintendent of the Hongkong Botanic Garden, and the seeds have already germinated. This is not the first time that the species has been in cultivation, however, for plants were received at Kew in 1874 from CHARLES

* Collected by AUGUSTINE HENRY in 1877 (Nos. 2678, 3374 and 3374A) and in 1888 (No. 7922), and by E. H. WILSON, who first obtained the plant in 1900 when collecting for Messrs. VEITCH ("No. 8 = 1099"), and subsequently in 1907 on the Arnold Arboretum Expedition (No. 2207).

FORD, of Hongkong, and the species evidently persisted at Kew until the end of the century, for it is recorded in the Hand-list of Tender Dicotyledons published in 1899.

Judging from the herbarium specimens and from SEEMANN's figure, the flowers are about 5-6 cm. in diameter and distinctly cup-shaped, the deep red petals being prevented from spreading to any extent by the relatively large firm bud-scales. The latter are broad, rounded, and densely minutely pubescent on the back, and, as previously noted, they are persistent in fruit. The stamens are about 3.5 cm. long and united from the base for nearly half their length; the ovary is hairy and so are the bases of the free styles. In cultivation *C. hongkongensis* will be readily recognized by its narrowly oblong blackish-green leaves. In Hongkong it flowers in January, and will probably flower at the same season in this country.

5. *Camellia japonica*.—There is perhaps no need to say anything about this, the common Camellia of gardens, for it is known to everybody. An account of its introduction into Europe and its development as a garden plant has been given by LENG and BUNYARD in the New Flora and Silva, V, 123-128 (1933), whilst Mr. BEAN in the same work, II, 75, 77 (1930), and in his Trees and Shrubs Hardy in the British Isles, deals with its merits as a hardy flowering shrub, and refers to some of the garden forms. The following epitome is included here for the sake of completeness.

The first plants to be grown in this country seem to have been those that Lord PETRE had in 1739; subsequently there were many introductions of various forms of the plant from China, and the Camellia was very soon taken up as a florist's flower and hundreds of varieties with flowers of all colours and of all degrees of doubleness were raised or imported. Coloured figures of a great many of these garden-forms will be found in the following works:

BAUMANN, Bollweilerer Camellien-sammlung (1828-35), with 49 coloured plates.

CHANDLER and BOOTH, Camellieae (1831), with 36 coloured plates.

BERLÈSE, Iconogr. Gen. Camellia (1841-43), with 300 coloured plates.

VERSCHAFFELDT, Nouv. Monogr. Camellia (1848-60), with 576 coloured plates.

The plant reached the height of its popularity about the middle of the nineteenth century, and, as Mr. BEAN has said, the prim stiffness and solidity of the flower makes it a rather appropriate floral emblem of that period.

When first brought into cultivation in this country the Camellia was treated as a stove plant, and it is interesting to note that CURTIS, when he figured it in the Botanical Magazine, t. 42, in 1787, remarked, "it is sometimes placed in the greenhouse; but it appears to us to be one of the properest plants imaginable for the conservatory." Subsequently, as we know, it became a most important greenhouse shrub, but it is only in comparatively recent years that its merits

as a hardy evergreen flowering shrub have been really appreciated. Actually, as might be expected from the fact that its natural home is in the mountains of Korea and Japan, *C. japonica* is perfectly hardy in this country, though not, of course, adapted for exposed windy positions. It flowers freely in the spring, and with its beautiful flowers and fine, shining, very dark green leaves it has a strong claim to be ranked as one of the handsomest shrubs in our gardens.

6. *Camellia Sasanqua*.—A native of Japan, occurring wild in the mountains of Kyushu and Shikoku, and in the Luchu Islands, this species was described and figured by THUNBERG in his *Flora Japonica*, p. 273, t. 30 (1784), from specimens obtained near Nagasaki. The wild plants seem to have white flowers and small leaves which are mostly 3·5–5 cm. long and 1·5–2 cm. broad. The species has, however, been cultivated in Japan for a very long time, and has long been one of the most popular garden-plants in that country. It is therefore not surprising to find that the cultivated races often differ very much from the wild stock. They differ not only in having larger flowers of all shades of colour from pure white to deep rose, and from single to double in form, but they also differ in having larger leaves, the latter being sometimes 6–7·5 cm. long by 2·5–3 cm. wide. SIEBOLD, who resided in Japan from 1823 to 1830, found that it held a high place among decorative plants in Japan and was frequently cultivated in gardens and in public places; whilst SARGENT, who travelled in Japan in the autumn of 1892, wrote, "*Camellia Sasanqua* . . . is perhaps more commonly encountered than the Tsubaki . . ."—and the Tsubaki is *C. japonica*!

C. Sasanqua is a winter-flowerer in Japan as it is with us, and this no doubt has a lot to do with its great popularity.

The first record of the introduction of the true *C. Sasanqua* into western Europe seems to be that in *Illustration Horticole*, XVI, t. 581 (1869), where a shoot of *C. Sasanqua* is figured along with a piece of *C. japonica*. In the text is the statement: ". . . deux bonnes figures . . . des *C. Sasanqua* et *japonica*, introduits récemment . . ." The shoot depicted has variegated leaves* and single deep rose-coloured flowers, exactly like a plant of Japanese origin in cultivation at Kew at the present time. Other plants at Kew (also from Japan) with similar flowers have ordinary normal green leaves.

C. Sasanqua was introduced into this country about 1879, CHARLES MARIES, collector for Messrs. VEITCH, sending material to that firm from Japan. Double white-flowered plants and single rose-flowered plants from this introduction were exhibited by Messrs. VEITCH at a meeting of the Royal Horticultural Society on December 13, 1892, and attracted considerable attention, a First Class Certificate being awarded to the rose-flowered plant. A coloured plate of it

* The upper leaves shown in the plate are the usual size for *C. Sasanqua*, but the lower ones are much larger. The piece of *C. japonica* that is figured on the same plate also has variegated leaves, and it is possible that when painting the two together the artist, by error, attached leaves of *C. japonica* to branches of *C. Sasanqua*.

appeared in *The Garden*, XLIV, 328 (1893), and in the accompanying article mention is made of a plant which had the foliage "prettily variegated."

Although the true *C. Sasanqua* does not seem to have reached Europe until about 1869, plants introduced into England on several occasions between 1811 and 1823 received the name *C. Sasanqua*. Under this name AITON (in his *Hortus Kewensis*, Ed. 2, IV, 235 : 1812) records the introduction in 1811 of plants that had been sent from China by Mr. WILLIAM KERR.* This *Camellia* was first figured in the *Botanical Register*, t. 12, in 1815, and of all the plants that were introduced prior to 1869, it is the one most like the true *C. Sasanqua*. The latter, however, seems to be confined to Japan, and does not occur wild in China so far as we know, although another species, *C. oleifera* Abel, which is very closely related to *C. Sasanqua* and has often been confused with it, is indigenous to China, where it is widely cultivated for the seeds from which an oil is obtained. It is not possible to be sure from the descriptions and figures whether the 1811 introduction is the indigenous Chinese species or whether it is the true *C. Sasanqua* obtained from a Chinese garden, but a small specimen in J. GAY's herbarium, now at Kew, is evidently from a plant of this introduction, and seems to be *C. oleifera* rather than *C. Sasanqua*.

In 1818 a double pink-flowered *Camellia* was brought from China by Capt. RAWES and passed under the name *C. Sasanqua* until LINDLEY recognized it as a distinct species and named it *C. maliflora* in 1827 ; an account of it has already been given (p. 357).

In 1823 a double white-flowered *Camellia* was introduced from China for the Horticultural Society by Capt. DRUMMOND, and became known as *C. Sasanqua flore pleno*, being figured under this name in the *Botanical Register*, t. 1091 (1827), etc. This, like the 1811 introduction, seems to be really the Chinese *C. oleifera*. The latter had been described and figured as a new species by ABEL in 1818 (*Journey in China*, pp. 174, 363), and was introduced two years later by Capt. NESBIT, also for the Horticultural Society. An excellent coloured plate of it appeared in the *Botanical Register*, t. 942 (1825), and for a long time it was maintained as distinct from the 1811 and 1823 introductions, which were regarded as the true *C. Sasanqua*. SEEMANN (in *Trans. Linn. Soc.*, London, XXII, 343 : 1859) united them all under the name *C. Sasanqua* and for many years afterwards there was confusion as to the distinctness or otherwise of the Chinese *C. oleifera* from the Japanese *C. Sasanqua*. E. H. WILSON, however, who had paid particular attention to *C. oleifera* in China and to *C. Sasanqua* in Japan, maintained that they were distinct species, and this view is now generally accepted as correct. Comparison of the field-specimens from China with those from Japan leaves no doubt

* KERR had been sent to the East to collect for the Royal Botanic Gardens, Kew, and it appears from a Kew MS. (where his name is spelt "Ker"—see also J. SMITH in *Gard. Chron.* N. Ser. XVI, 570 : 1881), that he was at Canton from 1809 to 1811, and from there, in all probability, the *Camellia* was dispatched.

in my mind that the Chinese plant is specifically distinct from the Japanese, and the differences between them may be summarized thus :

C. Sasanqua Thunb.: leaves thinly leathery, mostly 3.3–5 cm. by 1.5–2 cm., apex obtuse, sometimes produced for 1–2 mm. as a broad blunt acumen, margins crenulate; flower-bud-scales practically glabrous (the outer) to finely pubescent (the inner); stamens loose and spreading; fruits 1.5–1.8 cm. in diameter; seeds 1.2–1.5 cm. by 1.1 cm. *Distribution*, Japan.

C. oleifera Abel; leaves rigidly coriaceous, mostly 4.5–7 cm. by 2–3 cm., apex acute to acuminate, margins serrulate; flower-bud-scales somewhat tomentose (the outermost) to densely silky villose; stamens erect and closely cohering as a compact boss; fruits 2.2–2.8 cm. by 1.8–2.2 cm.; seeds 1.5–2.4 cm. by 1.4–1.8 cm. *Distribution*, China.

These differences are based, of course, on a study of the field-specimens, and will need emending for cultivated plants. Thus the difference in the size of the leaves does not hold, for, as already pointed out, *C. Sasanqua* in cultivation may have leaves up to 7 cm. long and 3 cm. wide. *C. oleifera* is not, apparently, in cultivation in this country now, although it is possible that an old plant may yet survive here and there, so that for the time being there is no need to carry the matter further.

It remains only to add that *C. Sasanqua* is quite hardy at Kew, where it is grown against a wall, and flowers profusely in the late autumn and early winter. It makes a fine plant and flowers magnificently in a cool greenhouse.

7. *Camellia reticulata*.—First brought to this country in 1820 and introduced again in 1824, this is perhaps the finest of all the species of the genus. The plants originally introduced were forms with double or semi-double flowers, obtained no doubt from Chinese gardens, and for over a century the species was known only from the garden-plants. In March 1932, however, specimens of a *Camellia* grown from FORREST'S seed (No. 25352) under the name *C. speciosa*, were sent by Mr. J. C. WILLIAMS, of Caerhays Castle, Cornwall, to the late Dr. O. STAFF, who recognized them as *C. reticulata* with single flowers, and an examination of the specimens in the Kew Herbarium brought to light a number of sheets, collected by FORREST during the years 1912 to 1925, which were passing under the name *Thea speciosa*, but which were undoubtedly *C. reticulata*.

The semi-double and double-flowered forms are fairly well known in gardens—there is a magnificent specimen in the Temperate House at Kew—and figures will be found in the Botanical Register, t. 1078 (1827), where the species was originally described by LINDLEY, in the Botanical Magazine, t. 2784 (1827), t. 4976 (1857), and in other publications. The single-flowered form grown by Mr. WILLIAMS was figured in the Botanical Magazine, t. 9397, in 1935.

C. reticulata has the largest flowers in the genus, and its large

dull leaves with their clearly visible venation (whence the specific name) render it easily recognizable even when not in flower.

All the wild specimens seen were collected by FORREST in the hills around Tengyueh, western Yunnan, especially on the Salween-Shweli divide to the north-east of the town.

8. *Camellia saluenensis*.—This species was first distinguished by the late Dr. O. STAFF in 1932, but his description of it, prepared a short time before his death in 1933, remains unpublished. STAFF's name was, however, placed on record by Mr. BEAN in the third volume of his *Trees and Shrubs*, but considerable doubt appears to exist as to the identity of the plants for which STAFF proposed the name. Plants of *C. saluenensis* have been found in cultivation under the names *Camellia* (or *Thea*) *speciosa*, *Camellia* (or *Thea*) *Pitardii* and *Thea Forrestii*, and in the following account an effort has been made to clear up the confusion.

The name *Thea Forrestii* can be dismissed at once; the plants concerned have nothing whatever to do with the true *Camellia* (*Thea*) *Forrestii*, and evidently received this name by some mistake.

The position with regard to the other names is different, and it will be most readily understood if the two names *Camellia speciosa* and *C. Pitardii* are dealt with separately, starting with the earlier, which is *C. speciosa*. I have already referred to the matter in my article on *C. reticulata* in the *Botanical Magazine*, t. 9397, but it may be useful to go over the ground again, in somewhat more detail, here.

Camellia (or *Thea*) *speciosa*.—This name no longer has any standing in botanical nomenclature. Two different plants received the name *Thea speciosa* independently of one another, and consequently matters are rather involved. The two plants were:

(1) *Thea speciosa* Kochs, described in 1901, and transferred to the genus *Camellia* in 1916 by COHEN-STUART, who correctly made the combination *Camellia speciosa* (Kochs) Coh.-Stuart for it. In 1925 it was shown to be actually a *Gordonia* and it therefore concerns us no longer, except in so far as the existence of the names *T. speciosa* and *C. speciosa* given to it affects the nomenclature of the second plant.

(2) *Thea speciosa* Pitard. This name was published with a description in 1912 by DIELS, who had found the name attached to a specimen, namely *Cavalerie & Fortunat* 2261, in the Paris Herbarium. PITARD had evidently given this name *T. speciosa* to the specimen in ignorance of the fact that KOCHS had already used it for another, and different, plant, and presumably DIELS also overlooked KOCHS' prior use of the name. In 1916 COHEN-STUART transferred PITARD's plant to *Camellia*—it is, by the way, a true *Camellia*—and since he already had a *Camellia speciosa* (see above), he had to find another name for this plant; he therefore named it *C. Pitardii*. Subsequently, in 1925, MELCHIOR showed that KOCHS' *T. speciosa* was really a *Gordonia*, and he then argued that since *T. speciosa* Kochs and

C. speciosa (Kochs) Coh.-Stuart became synonyms of a *Gordonia*, the epithet *speciosa* could be retained for PITARD's plant; he therefore named it *C. speciosa* (Pitard) Melchior. Such a practice, however, is contrary to the rules governing botanical nomenclature as they are now understood, and the correct name for PITARD's plant is *C. Pitardii* Coh.-Stuart. To this species we must now turn our attention.

Camellia Pitardii.—As stated above, the type-specimen is Cavalerie & Fortunat 2261, this being the specimen which PITARD had named "*Thea speciosa* Pitard" and which DIELS marked as "type"; with it DIELS identified Bodinier 2594, Delavay 4930 and Forrest 423. The Bodinier specimen is evidently the same as the type and they both come from Kweichow. I have not seen DELAVAY's specimen from Yunnan, but FORREST's 423, also from Yunnan, is very different from the Kweichow plants, and is not in my opinion conspecific with them. Its inclusion in *C. Pitardii*, however, has led to the latter being regarded as an extremely variable species, and an extraordinarily heterogeneous collection of specimens has been included in it. Among them were specimens of *C. reticulata* (q.v.) and *C. saluenensis*, and since the names *C. speciosa* and *T. speciosa* were commonly used for *C. Pitardii*, it is not surprising that plants so widely different as *C. reticulata* and *C. saluenensis* should have come into cultivation under the same name, *C. speciosa*. It will also be obvious now why this name has been replaced by *C. Pitardii*.

So far as I know, the first person to attempt to sort the mass of material that had been included in *C. Pitardii* into more homogeneous groups was the late Dr. STAPF, who had occasion to investigate the taxonomy and nomenclature of the material in connexion with a plant of *C. speciosa* that had been figured for the Botanical Magazine. Within *C. Pitardii* (in the wide sense) Dr. STAPF distinguished three species, *C. Pitardii* Coh.-Stuart, restricted to the Kweichow plants, and two new species, for both of which he proposed names. He had attached these names to the appropriate specimens in the Kew Herbarium, and had prepared descriptions of both his new species as well as of *C. Pitardii* (sensu stricto), and he intended to publish these descriptions along with an article giving the history of the plants. This article was started but never finished. One of his new species is *C. saluenensis*, but before dealing with it I may say that Dr. STAPF's treatment of *C. Pitardii* seems to be correct, and this name should be restricted to the Kweichow specimens (Cavalerie & Fortunat 2261, Bodinier 2594, and Cavalerie 855), with which may be identified a specimen collected by HENRY (No. 12875) at Szernao in S. Yunnan.

In the restricted sense *C. Pitardii* is a species with oblong to narrow elliptic leaf-blades, caudate at the apex, regularly minutely serrate along the margins, mostly 8–12 cm. long and 3–4 cm. wide, with petioles 8–15 mm. long; the flower is perhaps 7 or 8 cm. in diameter, with red or rose-coloured petals which are 4–5 cm. long and united for about 1.5 cm. at their base, stamens which are 2.5–3.5

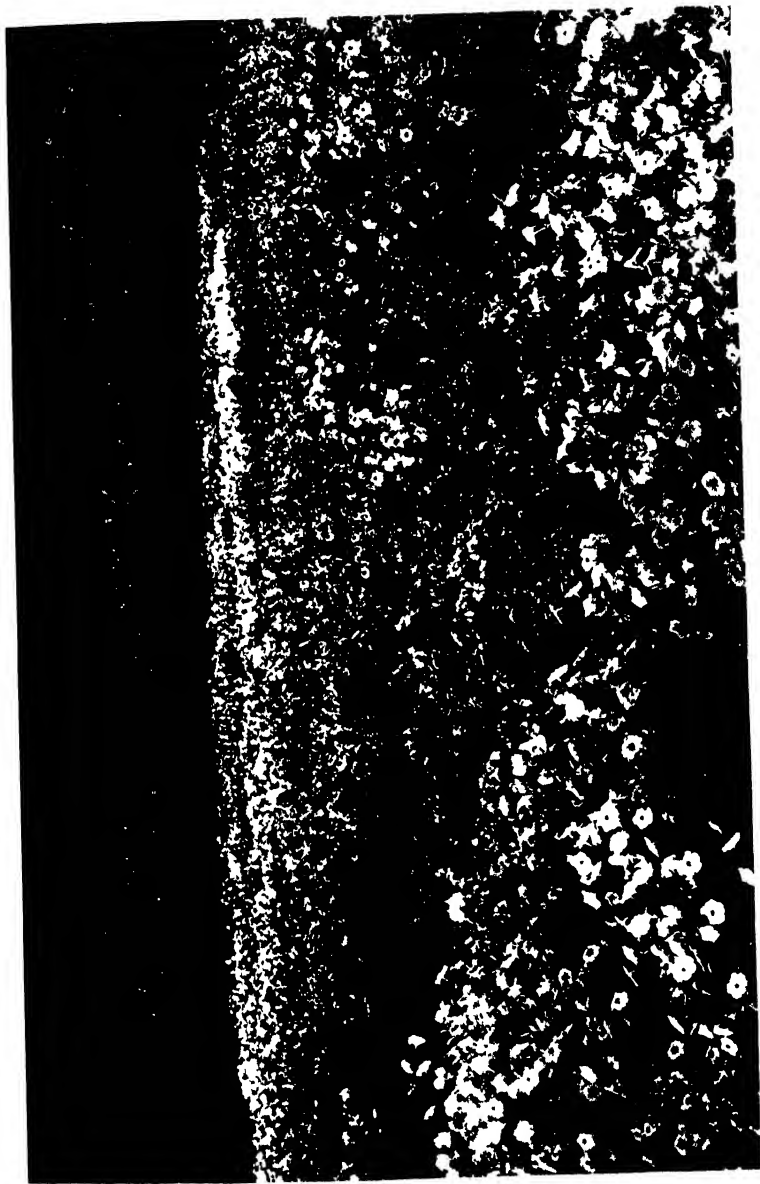


FIG 96 —PETUNIAS ON TRIAL IN R H S GARDENS WISLEY



11 07 DAMIAS AT WISLEY 1936

cm. long and united for over half their length from the base, and with a densely hairy ovary. It is evidently a magnificent species most nearly allied to *C. reticulata*, from which, however, it is easily distinguished by its narrower, more oblong leaves with their distinctly caudate apex, and by its somewhat smaller flowers. From the brief description of it given above, it will be evident that it is vastly different from the plants which have passed under the name *C. Pitardii* in gardens. So far as we know, the true *C. Pitardii* has never been in cultivation.

Camellia saluenensis Stapf ex Bean.—During the time that Dr. STAFF was working on the heterogeneous collection of material that had been placed in *C. Pitardii*, Mr. BEAN drew his attention to specimens of a *Camellia* grown by Mr. J. C. WILLIAMS from FORREST'S seed under the name *C. speciosa*, and Dr. STAFF identified them with one of his new species—the one which he had named *C. saluenensis*. As stated above, STAFF did not publish his work, but the name *C. saluenensis* Stapf was used by Mr. BEAN in the third volume of his *Trees and Shrubs for the Camellia* grown at Caerhays,* and the description given by Mr. BEAN covers the wild specimens named by STAFF as well as the cultivated plant.

The Caerhays plant was not the only one in cultivation that STAFF identified with his *C. saluenensis*, for he also gave this name to a plant which was figured for the *Botanical Magazine* from material sent by Lord HEADFORT from Kells (under the name *C. speciosa*), and also to a plant, identical with Lord HEADFORT'S, which is growing in the *Rhododendron Annexe* of the Temperate House and which had been raised from cuttings of a plant grown by Mr. J. C. WILLIAMS under the name *C. speciosa*.

Now the Caerhays plants described by BEAN differ considerably from those grown at Kew and Kells, and all of them differ to some extent from the wild material upon which the species was originally based. Before we go any further, therefore, we should know the kind of plant that STAFF actually distinguished as *C. saluenensis*. STAFF'S MS. description is given in full below †; all the specimens mentioned

* BEAN says "The plant was first identified as *Thea* (*Camellia*) *speciosa* Pitard, but the plant to which that name was originally given proves to be a *Gordonia*, hence DR. STAFF'S new name that heads this note." As explained in a previous section of this paper, however, it was KOCH'S *Thea speciosa* that proved to be a *Gordonia*, not PITARD'S *Thea speciosa*. The latter is a true *Camellia* but is not identical with *C. saluenensis*.

† *Camellia saluenensis* Stapf. *Frutex* 1-5 m. altus, multiramis, dense foliatus, ramis novellis magis minusve (interdum dense) hirsutiusculis, plerumque mox glabratiss, deinde fuscis vel griseo-fuscis. *Folia* breviter petiolata, approximata, internodiis plurimis 1 cm. haud superantibus; *laminae* plurimae oblongae (paucae elliptico-oblongae) e basi obtusae, rarius lanceolatae e basi attenuatae, subobtusae vel breviter acutae vel acuminatae, margine callosa dense glandulosodenticulato, 3.5-5 cm. longae, 1.5-2.3 cm. latae (ratione 1.6-3), coriaceae, facie lucidae, basi ad costam pilosulae vel glabratae, costa gracili prominula, nervis lateralibus utrinque 5-7 gracillimis prominulis vel obscuris, atro-virides, exsiccando olivaceae, dorso paulo pallidiores, novellae in dorso saepe adpresse pilosae, mox glaberrimae praeter costam ubi pili interdum diu persistunt, laxe prominule reticulatae; *petioli* crassi, 3-5 mm. (raro ad 8 mm.) longi, facie sulcati et pilosuli, dorso rotundati, glabri. *Flores* plerumque solitarii, interdum

are in the Kew Herbarium and all bear the determination "*C. saluenensis* Stapf" in STAPF's own hand. All these specimens hold together very well, with the possible exception of No. 15511, which is somewhat different from the others; it has leaves only, and may be left out of consideration.

STAPF's description is, as might be expected, impeccable; the description in English given below is not, however, a translation of STAPF's Latin, but has been drawn up independently from the same material. It will be observed that in the English description no attempt has been made to distinguish the perulae into bracts and sepals, and also that the dimensions of the stamens and styles are greater than in the Latin description. This follows from the examination of a flower from Forrest 17686 which had to be soaked off the sheet before it could be examined; the dimensions given by Dr. STAPF were based on the flowers on sheets 24090 and 26285 only.

STAPF did not mark any particular specimen as "type," and I have therefore chosen Forrest 17686.

Description of C. saluenensis Stapf (from wild material).—A densely leafy evergreen shrub 1–5 m. high; young twigs brownish, geminati, sessiles, sub-terminales; bracteae (perulae) circiter 5, rotundatae, tenuiter ciliatae, extimae glabrae, caeterae in dorso magis minusve tenuiter sericeae, rarius omnes glabrae. Sepala 5, rotundata vel late obovato-elliptica, ad 1.5 cm. longa, in dorso magis minusve tenuiter sericea, vel subglabra, tenuiter ciliolata, intima interdum magis minusve petaloidea, maturitate tarde decidua. Petala alba, rosea, vel carminea, 5, obovata, ad 4.5 cm. longa, ad 3 cm. lata, basi connata, exteriora in dorso superne magis minusve sericea vel omnes glabra. Stamina ad 2.2 cm. longa, ad medium vel ultra connata; antherae 2 mm. longae. Ovarium sericeo-tomentosum; stylus 1.5 cm. longus, apice 3-fidus. Capsula globosa, 2 cm. diametro, tomenti vestigiis induta; valvae lignosae. Semina 3, globosa, 1–1.2 cm. diametro.

Yunnan. Mountains of the Shweli basin north of Tengyueh between 25° 10' and 25° 55' N., 1800–2700 m.

Forrest 15511. Shrub of 12–14 feet. Flowers pink. In open thickets on the Ghi-shan. 25° 55' N., 9000 feet. August 1917.

Forrest 17686. Evergreen shrub of 6–12 feet. Flowers rose-pink. Open stony hillsides. Volcanic mountains N.W. of Tengyueh. 25° 10' N., 8000 feet. [Type.]

Forrest 24090. Evergreen shrub of 6–10 feet. Flowers white. Open scrub by streams in side valleys on the Shweli-Salween divide. 25° 20' N., 98° 58' E. 8000–9000 feet. April 1924.

Note.—A fine species though not a free flowerer. The foliage is especially pleasing, hard and shining.—G. F.

Forrest 25156. Evergreen shrub of 10–15 feet. In fruit. In open thickets in side valleys on the Shweli-Salween divide. 25° 45' N., 98° 58' E. 7000–8000 feet. September 1924.

Forrest 25321. Shrub of 6–10 feet. In fruit. Flowers white(?). In thickets in shady gullies on the hills N.W. of Tengyueh near Hway-Yow. 25° 18' N., 98° 36' E. 7000 feet. October 1924.

Note.—Good evergreen foliage but rather straggly and open in habit.

Forrest 26051. Shrub of 10–14 feet. Flowers crimson. In thickets on the Shweli-Salween divide. 25° 40' N., 98° 50' E. 8000–9000 feet. November 1924.

Forrest 26285. Evergreen shrub of 4–6 feet. Flowers from white to deep rose, fleshy. On cliffs and steep grassy slopes amongst scrub in side valleys on the hills N.W. of Tengyueh. 25° 20' N., 98° 30' E. 6000–7000 feet. March 1925.

Note.—Good habit and attractive foliage, but a shy flowerer.

Forrest 27159. Shrub of 4–6 feet and as much through. In fruit. In thickets and amongst scrub on rocky slopes on the hills N.W. of Tengyueh. 25° 20' N., 98° 30' E. 6000–7000 feet. August 1925.

glabrous or soon glabrescent, rarely hairy. *Leaves* shortly stalked ; *blades* mostly oblong or oblong-elliptic from a cuneate to rounded base, apex acute to obtuse, mostly 3.5-4.5 cm. long and 1.3-1.8 cm. wide, but sometimes up to 5.6 cm. long and 2.3 cm. wide, coriaceous, shining and dark green above, paler below, glabrous, or villose along the midrib below, margins closely and regularly serrulate-denticulate, the "teeth" black-tipped ; *petiole* stout, mostly 4-5 mm. long, rarely 7 mm. long, pubescent. *Flowers* about 5-6 cm. in diameter. *Bracts* and *sepals* forming a single series of bud-scales, caducous ; the outer small, semi-orbicular, scale-like, practically glabrous or slightly finely pubescent in the middle towards the apex ; the inner obovate, about 1.5 cm. long and as wide, thinner, herbaceous, densely finely pubescent on the back, the innermost often petaloid. *Petals* white to deep rose-pink, united among themselves and to the stamens for about 1 cm. at the base, obovate, notched, 3-4 cm. long, 1.6-2.5 cm. wide, the outer shortest and more pubescent towards the apex on the back, the intermediate broadest, the innermost narrowest and quite glabrous. *Stamens* 2.5-3 cm. long, the filaments united half their length from the base to almost their whole length and forming a fleshy cup. *Ovary* densely white-hairy ; *style* up to over 2 cm. long, trifid at the apex for 3-4 mm. *Fruit* globose, about 2.5 cm. in diameter. *Seeds* dark brown, about 11 mm. long and as wide or wider.

As will be seen from the field-notes which are quoted at the end of the Latin description, FORREST collected this species in the hills north-west of Tengyueh, Yunnan, and on the mountains of the Shweli-Salween divide north-east of that town, the habitat being thickets and scrub on steep slopes and stony hillsides.

In the type of flower as in the type of toothing of the leaves, *C. saluenensis* resembles *C. Pitardii* and *C. reticulata* ; from both of these species, however, *C. saluenensis* is easily distinguished by its much smaller and blunter leaves, which, though they may be sometimes acute, are never acuminate as in *C. reticulata*, much less caudate as in *C. Pitardii*. The flowers in *C. saluenensis* are also smaller in all their parts than those of the two other species mentioned.

Having now fixed the identity of STAPF's *C. saluenensis*, we can turn to a consideration of the plants in cultivation.

Camellia saluenensis in Cultivation.—As stated at the beginning of the previous section of this article, Dr. STAPF identified plants grown at Caerhays (under Forrest No. 24090), Kells and Kew (Forrest numbers not known) with his *C. saluenensis*, and to these can be added plants grown at Exbury also from seeds sent home by FORREST. Of these plants the last-mentioned agrees most closely with the wild material of *C. saluenensis* ; a coloured plate of a shoot from this plant appeared in the Gardeners' Chronicle, Ser. 3, C. 329 (1936), and this is an excellent match of the wild specimens.

The plants grown at Caerhays under Forrest 24090 (the wild specimen of which is undoubtedly *C. saluenensis*) fall into two forms, one having the leaves considerably larger than the other.

The flowers in both are identical, deep rose-pink in colour (note that FORREST described the flowers of his 24090 as "white"), and match the flowers of the Exbury plants and those of the field-specimen of Forrest 17686 perfectly. In one of the Caerhays forms the leaf-blades are 4.5-6 cm. in length and mostly 1.8-2.2 cm., but sometimes up to 3 cm. in width; they are thus slightly larger than the leaves of the field-specimens, but the difference may be accepted as due to cultivation. In the other form, however, there is a much more marked difference in size, the leaf-blades being 5.5-8 cm. long and 2.5-4 cm. wide, as against 3.5-5.6 cm. by 1.3-2.3 cm. of typical wild *saluenensis*. It is difficult to know how to treat this plant; there are no field-specimens corresponding with it, and on the whole it seems best to consider it as a cultivated aberration for the time being.

The plants grown at Kells and Kew also have leaves larger than those of the wild specimens of *C. saluenensis*, though similar to them in form. In size they are very similar to the smaller-leaved Caerhays plant of F. 24090, from which they differ in being somewhat less coriaceous and dull, not shining, on the upper surface. The flowers of the Kells and Kew plants, however, are considerably different from those of the Caerhays and Exbury plants. In the latter the stamens are about 3 cm. long and united the greater part of their length into a prominent fleshy cup which is more than half the length of the petals, whereas in the Kells and Kew plants the stamens are about 2 cm. long and much less fleshy and less prominent, and the flowers are much laxer than those of the Caerhays and Exbury plants. These differences are, moreover, combined with differences in colour, the Caerhays and Exbury plants having deep rose-pink petals, whilst the Kells and Kew plants have petals whitish flushed pale pink, and altogether the flowers of the two different types of plant differ quite considerably. We cannot, however, lay any stress on the colour-differences, particularly as FORREST records variation from white to deep rose-pink in the wild plants, and the other differences are not outside the range possible in species of this genus. On the whole I am inclined to refer all the cultivated plants to *C. saluenensis*, at least for the time being. It might perhaps be convenient to distinguish the plants grown at Kew and Kells, and the larger-leaved Caerhays plant as distinct "forms," but this too may well be held over for a while until we know more about the variation of the species in cultivation, and how far it is due to environmental conditions.

Field-specimens allied to C. saluenensis and C. Pitardii.—When dealing with *C. Pitardii* I stated that Dr. STAPF proposed two new species when he revised the material that had been included under this name, one of them being *C. saluenensis*. Of the other new species I have made no mention so far, but the discussion, in the previous section of this paper, on the variation shown by *C. saluenensis* in cultivation, leads me to add a few notes concerning STAPF's second species. It will be remembered that a very heterogeneous collection

of material had been referred to *C. Pitardii*; it included specimens of *C. reticulata*, *C. Pitardii* itself, *C. saluenensis*, a double-flowered form of *C. japonica* (Forrest 26126), and a number of other specimens which do not fall within the limits assigned to any of these (or other) species. The bulk of these unnamed specimens forms STAPF's second new species. It differs from *C. saluenensis* principally in having larger leaves (the blades being mostly 5.5-7 cm. long and 2-3 cm. wide, and the petioles 5-10 mm. long), which are, moreover, lanceolate or sub-oblong from an attenuated base, and having the apex acuminate, rarely acute or sub-obtuse. The flowers are very similar to those of *C. saluenensis*; on some specimens they are just like those described for the wild material of that species and for the Exbury and Caerhays plants, on other specimens they are like those of the plants of *C. saluenensis* grown at Kells and at Kew. With this in mind, and remembering also the variation in the size of leaf exhibited by the cultivated plants of *C. saluenensis*, the question arises: can we reasonably keep STAPF's second new species distinct from *C. saluenensis*? If not, should it be referred to *C. saluenensis* as a distinct variety, or should it be included in that species without distinction, the species being regarded as varying to a considerable degree? The problem is really one of the delimitation of the species within the genus as a whole, and it seems desirable that further study on more material should be undertaken before a decision is reached. Therefore it is proposed to hold over the publication of the second new species proposed by Dr. STAPF for the time being. So far no cultivated plants have been seen that could be referred to this doubtful species, but since FORREST collected it in the fruiting condition in September 1912 (No. 11093) there is a possibility that it may be in cultivation.

PLANTS TO WHICH AWARDS HAVE BEEN MADE IN 1937.

Alstroemeria Ligta var. **angustifolia** 'Vivid.' A.M. June 22, 1937. From Messrs. W. A. Constable, Burnham Lily Nursery, Burnham, Bucks. *Alstroemeria Ligta* var. *angustifolia*, which received the Award of Merit on July 3, 1928, is a tall, sturdy, herbaceous plant with pale rose-pink, orange-striped flowers freely produced in large, terminal umbels. The present form differs only in its salmon-coloured flowers, which are lightly suffused with orange.

Angulocaste × 'Georgius Rex.' A.M. May 25, 1937. An interesting hybrid obtained by crossing *Anguloa Cliftonii* with *Lycaste* × *Immschootiana*. The wax-like flower is mainly lemon-yellow, with profuse minute spotting of red on the petals and on the side lobes of the labellum. Exhibited by Sir Jeremiah Colman, Bart., Gatton Park, Reigate.

Begonia pendula 'Scarlet Glow.' A.M. June 8, 1937. From Messrs. Blackmore & Langdon, Bath. A very handsome pendulous variety suitable for growing in hanging baskets. The abundant double flowers are bright orange-scarlet, deepening in colour towards the centre.

Brassocattleya × 'Windsor.' A.M. June 22, 1937. The spike bore two large and well-formed flowers, of soft rose colour in the sepals and petals, and rich purple in the wide labellum. Obtained by crossing *B.-c.* × 'Princess Patricia' with *C.* × 'Wembley.' From Messrs. Black & Flory, Slough.

Cymbidium × 'Bullfinch.' A.M. May 25, 1937. The spike bore seven large flowers, with well-formed sepals and petals, ivory shaded with buff, the labellum marked with numerous red spots. The result of crossing *C.* × *Alexanderi* with *C.* × 'Garnet.' Exhibited by Lionel de Rothschild, Esq., Exbury, Southampton.

Cymbidium × 'Cremona' var. 'Indian Prince.' A.M. May 25, 1937. A distinct hybrid obtained by crossing *C.* × *Cooperi* with *C.* × 'Cygnet.' The spike bore 7 flowers, with the sepals and petals deep rose veined with brown, the labellum dark crimson on the front lobe and having a yellow crest. Shown by Messrs. McBean, Cooksbridge.

Cymbidium × 'Dorchester' var. 'Magnolia.' A.M. May 25, 1937. The erect spike bore 9 large flowers, ivory-white, except for a rose-crimson column and markings of similar colour on the labellum. Produced by crossing *C.* × *Alexanderi* with *C.* × 'Tityus.' Shown by N. Prinsep, Esq., The Boxes, Pevensey Bay.

Cymbidium × 'Profusion' var. 'Grand Monarch.' A.M. May 25, 1937. The spike bore 10 large salmon-red flowers, the labellum rose-pink with reddish spots. Shown by Messrs. McBean. Obtained by crossing *C.* × 'Ceres' with *C.* × 'Vesta.'

Genista lydia. A.M. June 8, 1937. From the Director, R.H.S. Gardens, Wisley. A small shrub suitable for the rock garden, forming a rounded bush 2 feet or so in height with freely branched, interlacing growths bearing linear leaves $\frac{1}{2}$ inch long. The bright yellow flowers are produced, usually in clusters of 4, at the tips of short, leafy twigs.

Iris \times ochraurea. A.M. June 22, 1937. From F. Wynn Hillings, Esq., Grove Way, Esher, Surrey. A hybrid between *Iris aurea* and *I. ochroleuca*, raised by the late Sir Michael Foster. Plant some 5 feet tall, with rigid foliage. Flowers of similar size to *I. ochroleuca*; standards light yellow, falls of a rich clear yellow, edged cream. Free flowering.

Iris chrysographes rubella. A.M. June 8, 1937. From Major F. C. Stern, M.C., Highdown, Goring-by-Sea. Closely resembling *Iris chrysographes* in flower and habit with an almost solid stem. Flowers deep plum-purple, with no gold blotch on the falls.

* **Lupinus polyphyllus 'Cavaller.'** A.M. June 2, 1937. From Messrs. W. H. Simpson, Birmingham. Flower spikes 16-24 inches; standards dull scarlet-cerise; wings bright reddish-cerise. Flowering from May 22.

* **Lupinus polyphyllus 'Delightful.'** A.M. June 2, 1937. From Messrs. W. H. Simpson, Birmingham. Flower spikes 30 inches; standards old rose flushed violet at middle, deepening with age; wings old rose. Flowering from May 20.

* **Lupinus polyphyllus 'Eileen Reave.'** A.M. June 2, 1937. From Mr. J. T. West, Brentwood. Flower spikes 12-24 inches; standards soft rose-pink with carmine blotch; wings soft rose-pink. Flowering from May 27.

* **Lupinus polyphyllus 'Jean Smith.'** A.M. June 2, 1937. From Messrs. W. H. Simpson, Birmingham. Flower spikes 18-24 inches; flowers evenly spaced, standards deep carmine-rose with a small violet blotch; wings rich carmine-rose. Flowering from May 22.

* **Lupinus polyphyllus 'La France.'** A.M. June 2, 1937. From Messrs. W. H. Simpson, Birmingham. Flower spikes 18-30 inches; standards opening rose-pink with white centre, becoming deep rose with darker centre; wings opening rose-pink, deepening with age to deep rose. Flowering from May 25.

* **Lupinus polyphyllus 'Lavender Bee.'** H.C. June 2, 1937. From Messrs. Bath, Wisbech. Plants of compact habit; flower spikes 15-20 inches; standards lavender with rosy-lilac blotch; wings lavender with deeper and distinct veins. Flowering from May 28.

* **Lupinus polyphyllus 'Maize Queen.'** H.C. June 2, 1937. From Messrs. W. H. Simpson, Birmingham. Flower spikes 15-22 inches; standards light maize-yellow with deep yellow blotch; wings light maize-yellow. Flowering from May 29.

* **Lupinus polyphyllus 'Monster.'** A.M. June 2, 1937. From Messrs. W. H. Simpson, Birmingham. Flower spikes 18-28 inches;

* Award made after trial at Wisley.

standards violet-blue (small white blotch with violet margins) ; wings deep rich violet-blue. Flowering from May 27.

* **Lupinus polyphyllus 'Robert Wood.'** A.M. June 2, 1937. From Messrs. W. H. Simpson, Birmingham. Flower spikes 18-26 inches ; standards bronzy-cerise ; wings clear dull rose. Flowering from May 27.

* **Lupinus polyphyllus 'Sunkist.'** A.M. June 2, 1937. From Messrs. W. H. Simpson, Birmingham. Flower spikes 18-24 inches ; flowers sweetly scented ; standards pinkish apricot with a large yellow blotch ; wings clear pinkish biscuit-apricot. Flowering from May 25.

* **Lupinus polyphyllus 'Windsor Lad.'** A.M. June 2, 1937. From Messrs. W. H. Simpson, Birmingham. Flower spikes 18-30 inches ; standards bright yellow with a narrow deep orange-pink margin ; wings deep orange-pink, deepening with age. Flowering from May 27.

Lycaste × **'Queen Elizabeth.'** A.M. May 25, 1937. This elegant hybrid was obtained by crossing *L. Locusta*, Sander's var. with *L. Skinneri alba*. The flower is of stiff texture, ivory-white with greenish shading, the labellum having a yellow crest. Exhibited by Sir Jeremiah Colman, Bart.

Miltonia × **'Albanian'** var. **'Her Majesty.'** A.M. May 25, 1937. This plant bore a spike of 4 large and well-formed flowers of almost uniform ruby-crimson colour. It results from the crossing of *M.* × *'Lycaena'* with *M.* × *'St. Alban,'* and was exhibited by Messrs. Sanders, St. Albans.

Miltonia × **'Deirde Savile.'** A.M. June 22, 1937. This plant bore two spikes, with 4 and 5 flowers respectively, of almost uniform ruby-crimson colour. It results from the crossing of *M.* × *'Lycaena'* with *M.* × *'Marion Bruce.'* Exhibited by S. Hinchcliffe, Daleside, Leeds Road, Harrogate, Yorks.

Miltonia × **'Kensington.'** A.M. May 25, 1937. A distinct *Miltonia* obtained by crossing *M.* × *'Kennie'* with *M.* × *'Memoria F. Sander.'* The spike bore 5 flowers, rose-coloured, the labellum heavily blotched and spotted with dark purple. Exhibited by Messrs. Black & Flory, Slough.

Odontoglossum citrosimum var. **'Princess Mary.'** A.M. May 25, 1937. This is an unusually fine variety of a species that was formerly seen in many gardens. The pendulous spike bore 18 whitish flowers, the labellum tinged with rose and having a yellow crest. Exhibited by Sir Jeremiah Colman, Bart.

Odontoglossum × **Perryanum** var. **'Shalston.'** A.M. June 22, 1937. This showy hybrid between *O.* × *'Camilla'* and *O.* × *'Toreador'* bore a spike of 8 flowers, with broad sepals and roundly formed petals, all of which are tinged with rose and profusely marked with small purplish spots. The labellum has a yellow crest area and a dark-red blotch on the central area. Exhibited by H. S. Wharton, Esq., Shalston, Templewood Avenue, Hampstead. *

* Award made after trial at Wisley.



FIG 98 A BORDER OF ANNUALS AT WISLEY 1936

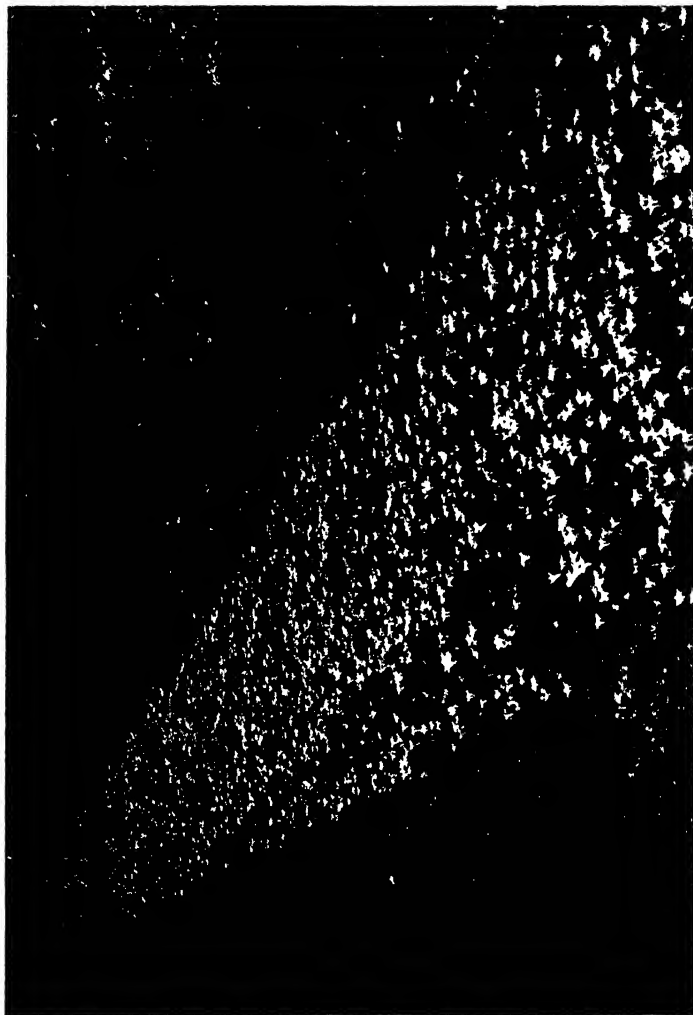


FIG 99 —GENTIANA SINO-ORNATA AT WISLEY, 1936.

[To face p 373.

Odontoglossum × '**Tordonla.**' A.M. May 25, 1937. An elegant hybrid with unusually well-formed flowers, 5 of which were carried on the erect spike. The segments are rose-tinted and marked with more or less confluent blotches of reddish colour. The parents are *O.* × '*Clydonia*' and *O.* × '*Toreador.*' Shown by Messrs. Charlesworth, Haywards Heath.

Odontoglossum × '**Viscountess Ullswater.**' A.M. May 25, 1937. The result of crossing *O.* × '*Ascania*' with *O.* × '*Iphis.*' The spike bore 3 flowers, deep yellow with red-brown markings. Exhibited by F. J. Hanbury, Esq., Brockhurst, East Grinstead.

Oncidium luridum var. '**Golden Glory.**' A.M. May 25, 1937. A very rare form of this tropical American species, the flowers being bright golden-green except for the whitish column. The graceful and extended spike of 73 flowers gave a beautiful effect. Exhibited by Sir Jeremiah Colman, Bart.

Rhododendron × '**Cowslip.**' A.M. May 4, 1937. A cross between *R. Williamsianum* and *R. Wardii*, from Lord Aberconway, Bodnant, N. Wales, shown as a hardy flowering plant for rock garden and general garden use. The pale primrose, widely campanulate flowers, up to 2½ inches broad by 1½ inch deep, are in loose trusses of about five. The ciliate pedicels and the young wood are reddish; the leaves, about 2½ inches long by 1¾ inch wide, are cordate at the base and rounded at the apex. The plant follows the habit of growth of *R. Williamsianum*.

Rhododendron × '**Decsoul.**' A.M. May 25, 1937. From W. S. Whitaker, Esq., Pylewell Park, Lymington, Hants. A hardy hybrid between *R. decorum* and *R. Souliei*, with widely campanulate flowers up to 2½ inches broad by 1½ inch deep, rosy when in bud, paling to almost pure white when fully expanded, borne in loose trusses of 8 or 9 flowers. The ovate-oblong leaves are rounded at the apex, glabrous, up to 4 inches long by 1½ inch broad.

Rhododendron × '**Diva.**' A.M. May 25, 1937, shown by Lionel de Rothschild, Esq. A hardy cross between *R.* × '*Ladybird*' and *R. Griersonianum*, with carmine-scarlet flowers spotted brownish within, borne in compact spherical trusses. The widely funnel-shaped corolla with spreading lobes is up to 3½ inches broad by 2 inches deep, and the glabrous, oblanceolate leaves about 8 inches long by 2½ inches wide are dull green on the upper surface and lighter below.

Rhododendron exquisitum. A.M. May 25, 1937. Shown by Lionel de Rothschild, Esq. The deeply lobed, spreading corollas, up to 2½ inches broad by 1 inch deep, are light mauvish-pink lightly spotted with crimson within at the base of the tube; borne in loose trusses of about 5 flowers. The small leaves, up to 2 inches long by 1 inch broad, slightly cordate at the base and rounded at the apex, are shiny above and minutely red-dotted below. Hardy.

Rhododendron × '**Firetail.**' F.C.C. May 25, 1937. A hardy hybrid between *R.* '*Britannia*' and *R. erogynum*, for the woodland garden, from J. J. Crosfield, Esq., Romsey, Hants. The funnel-

shaped deep scarlet flowers, spotted brown within, up to $2\frac{1}{2}$ inches broad by 2 inches deep, are borne in fairly compact trusses of 10 or 11; leaves oblanceolate, glabrous above, faint brown tomentum beneath, up to 9 inches long by 3 inches broad.

Rhododendron × '**Lady Berry.**' A.M. May 25, 1937. Shown by Lionel de Rothschild, Esq. The long narrow-tubed flowers are deep reddish-orange on the lobes, shading to a deeper colour on the tube, up to 2 inches wide by $2\frac{1}{2}$ inches deep; the small ovate leaves are red dotted below and shiny green above. Raised from *R.* × '*Rosy Bell*' crossed with *R.* × '*Royal Flush.*' Hardy.

Rhododendron × '**Sellg.**' F.C.C. May 25, 1937. From Lady Loder, Leonardslee, Horsham, Sussex. A hardy hybrid between *R. calophyllum* and *R. cinnabarinum* var. *blandfordiacflorum*, with long narrow-tubed deeply lobed flowers up to 3 inches deep by 2 inches broad, the lobes 1 inch long; corolla lobes pink, shading to salmon-pink and orange on the tube; 6 or 7 flowers in each loose truss. The narrowly lanceolate leaves are dark and shiny above, with red glandular dots below.

Rhododendron × '**Sir Frederick Moore.**' A.M. May 25, 1937. From Lionel de Rothschild, Esq. A hardy hybrid between *R. discolor* and *R.* × '*St. Keverne*' with widely funnel-shaped flowers, up to $5\frac{1}{2}$ inches broad by 3 inches deep, wavy lobed, clear pink with crimson spots within at the base of the tube, borne in large, compact, spherical trusses of about 11. The oblong to ovate obtuse leaves, up to 8 inches long by $3\frac{1}{2}$ inches broad, are glabrous on both sides.

Rhododendron × '**Touchstone.**' A.M. May 25, 1937. A seedling of *R. Griffithianum roseum superbum*, from J. J. Crosfield, Esq., with large, rather loose trusses of about 11 flowers; flowers up to 4 inches broad by 3 inches deep, a beautiful clear red-pink, with perhaps a faint touch of blue; petioles viscid, pink; leaves ovate-lanceolate, glabrous on both sides, up to 6 inches long by 2 inches broad.

Vanda × **Rothschildiana** var. '**Alpha.**' F.C.C. May 25, 1937. This interesting hybrid between *V. coerulea* and *V. Sanderiana* bore a spike of 10 flowers, which are of a beautiful lilac-blue colour, with venation of a deeper tint. Exhibited by Messrs. Sanders, St. Albans.

Vuykstekeara × '**Josephine Kirkpatrick.**' A.M. May 25, 1937. The erect spike bore 4 comparatively large flowers having reddish-crimson sepals and petals, and a labellum which is crimson at the base and much spotted on the main area. The result of crossing *Odontonia* × '*Nesta*' with *Vuykstekeara* × '*Aspasia.*' Shown by N. Prinsep, Esq.

BOOK REVIEWS.

"The Small Alpine Garden." By Captain H. P. Leschallas, M.B.E. 8vo. 79 pp. (Rush & Warwick, Bedford, 1937.) 3s. 3d. post free.

The author, quite a successful cultivator of the more difficult alpine plants, informs the reader about his methods in a somewhat jerky and abrupt style. He explains crevice and scree planting and advocates the use of a graduated scree mixture to the depth of only sixteen inches. This would hardly be sufficient in drier parts of the country unless frequent overhead watering were applied, to the detriment of the flowers. Deep cultivation for alpine plants is always desirable, a depth of two feet being normal, but three feet being better. An excessive number of printing errors detracts from the value of the booklet.

P. ROSENHEIM.

"Flora des Südens, d.h. Insubriens, des südlichen Tessins und Graubündens und des Gebietes der ober-italienischen Seen. (Langensee bis Gardasee.)" 8vo. viii + 151 pp. 32 col. plates, 40 half-tones, 59 text figures. (Rascher Verlag, Zurich and Leipzig, 1936.) Swiss Francs 12.00.

In the ancient Roman Empire the "Insubres," a people of Gallic origin, occupied a district on the southern slopes of the Central European Alps down to the foothills, extending roughly from Lago Maggiore in the west to Lago di Garda in the east. Their capital was Mediolanum, the modern Milan. The main portion of this country belongs now to Italy, but the southern parts of the cantons Grisons and Ticino (in the north) are Swiss. Following A. von Haller, the Continental botanists have accepted the "insubrian" district as a plant-geographic centre and the renowned and venerable Swiss Professor Schröter has written a fascinating account of the flora, indigenous, adventive and introduced. The gardens situated on the charming lakes are well known for their luxurious growth of foreign vegetation, whilst the mountains contain among many interesting alpine plants a good number of endemics. We may conjure up a vision by mentioning Monte Salvatore, Legnone, Grigna and Tombea. The book is very instructive for all plant-lovers, tyro and advanced alike, and well written. The coloured lithographic plates, if not artistic, are adequate and the half-tones of gardens quite good.

Probably exchange difficulties at the time of issue prohibited an English translation, which would have made the book a worthy companion to the Professor's "Coloured Vademecum to the Alpine Flora." We may hope that more normal times will permit a rectification of this omission.

P. ROSENHEIM.

"Spring Frosts." Forestry Commission Bulletin No. 18. 8vo. 131 pp. (H.M. Stationery Office, London, 1937.) 2s. 6d., by post 2s. 9d.

This detailed work, by Messrs. W. R. Day and T. R. Peace of the Imperial Forestry Institute, Oxford, covers England, Wales and Scotland, and is chiefly concerned with the silvicultural aspects of the problem, but as the factors predisposing to frost liability are equally applicable to gardens and orchards much of practical utility may be gleaned from a study of the data and theories here presented.

Extracts from the table of contents will sufficiently indicate the scope of this Bulletin.

(a) Temperature of the ground air zone and factors affecting it (pp. 14-26).

(b) Nature of late frost injury to trees and shrubs (pp. 29-35).

(c) Occurrence, distribution, and relative severity of the late May frosts, 1935 (p. 39).

(d) Damage to trees and shrubs (pp. 48-87).

This includes under separate headings both conifers and broad-leaved species and is arranged alphabetically. The authors have here utilized information already published concerning the damage at Kew and Wisley, an unpublished report on that at the National Pinetum at Pedgebury, Kent, and those from the State Forests, as well as personal and other observations.

(e) Silvicultural aspects of shelter against frost (pp. 90-107).

Two appendices deal respectively with the weather conditions associated with the frosts of May 1935, and the influence of topography on severity of frost; the latter is accompanied by twelve district sketch maps. The Bulletin contains numerous tables and diagrams, many of which are original, and concludes with a bibliography of forty-eight items and a series of eleven plates chiefly demonstrating types of injury to trees at various stages of growth.—B. O. MULLIGAN.

NOTES AND ABSTRACTS.

Chinese Flora of S. Tibet, N.E. Burma and Bhutan, Contributions to. By C. V. B. Marquand (*Kew Bull. Misc. Inf.* 3, 1937, pp. 181-191).—The Gentians collected by Capt. Kingdon Ward, and Messrs. Sharma, Ludlow, and Sheriff in the area indicated are listed with the collectors' notes, and five new species are described, viz. *G. microtophora*, *G. chakangensis*, *G. Ludlowi*, *G. muscicola*, and *G. simulatrix*.—F. J. C.

Gentiana cephalantha Franch. apud Hemsl. By C. V. B. Marquand (*Bot. Mag.*, t. 9468; Nov. 1936).—A somewhat tender perennial herb from the north-west Yunnan, up to 1 foot high with terminal clusters of narrowly funnel-shaped blue or mauve flowers with unequal corolla lobes conspicuously green spotted within towards the apex, densely congested.—M. S.

Gentiana, New Chinese Species. By H. Smith (*Kew Bull. Misc. Inf.* 3, 1937, pp. 125-134).—Ten new species, *Gentiana quaterna* (which may be a hybrid) with three subspecies or varieties, *G. viatrix*, *G. hexaphylla septemloba*, *G. allorum*, *G. pseudodecumbens*, *G. oligophylla*, *G. inconspicua*, *G. heleonastes*, *G. Licentii*, *G. aphrosperma* and *G. flexicaulis* are described all from China. The occurrence of hybrids in the Frigida group with derivatives therefrom is suggested and the name *G. quaterna* covers these.—F. J. C.

Gentians of China. By C. V. B. Marquand (*Kew Bull. Misc. Inf.* 3, 1937, pp. 134-180).—One hundred and eighty-four species are recognized in this list as native of China and keys to the sections and to these species are given.—F. J. C.

Leptospermum Rodwayanum. By V. S. Summerhayes and H. F. Comber (*Gard. Chron.*, Sept. 5, 1936, fig. 74).—A new species described from specimens collected by Comber and previously by others near the east coast of Tasmania in April 1930. Exhibited in London, August 5, 1936, as *Leptospermum* sp. C. 2321, and received P.C. (See R.H.S. JOURNAL 61, p. clxxi.) Flowers large and pure white, up to 1½ inch wide; fruit fleshy, notable for being covered with small membranous scales, and increasing in size gradually for several years until dehiscence occurs when the neighbouring leaves have fallen. Named after the late Mr. L. Rodway, author of a Tasmanian Flora. Related to *L. lanigerum* Sm. var. *grandifolium* Maiden and Betche, but distinguished by the blunter obovate leaves and larger glabrous fruit.—B. O. M.

Lilium × burnhamense. By H. F. Comber (*Gard. Chron.*, Sept. 19, 1936, fig. 89).—This hybrid was raised at the Burnham Lily Nursery, Bucks, by artificially pollinating *Lilium neilgherrense* Wight with *L. Wallichianum* Schultes fil. in the summer of 1934. In its second growing season (1936) the plant attained a height of 3 feet and bore a single flower. While resembling the latter parent in most characters the leaves were twice as wide as in that species and showed traces of the callose tip of *L. neilgherrense*.—B. O. M.

Magnolia globosa Hook & Thoms. By J. E. Dandy (*Bot. Mag.* t. 9467; Nov. 1936).—A hardy shrub or small tree native in the Eastern Himalaya to south-eastern Tibet and the extreme north-west of Yunnan, distinguished from other species by the rufous- to greyish-hairy undersurface of the leaves, which are densely so when young. It resembles in flower colour and general character *M. sinensis*, *M. Wilsonii*, and *M. Sieboldii*.—M. S.

Medinilla Scortechinii King. By H. K. Airy Shaw (*Bot. Mag.*, t. 9466; Nov. 1936).—An epiphytic stove house shrub from Perak and Selangor in the Malay Peninsula, up to 3 feet 4 inches high with large ovate leaves, and many-flowered axillary thyrses bright coral red throughout, the flowers about 1 inch across, petals spreading. The plant is easily propagated by cuttings.—M. S.

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GARDENS OF EASY MAINTENANCE

By R. S. LYNCH.

[Read June 22, 1937; Mr. C. ELEY, F.L.S., in the Chair.]

THE unusual title of my lecture will not, I trust, engender an exaggerated optimism as regards garden maintenance. It is due to considerable experience which has led me to think that one can best assist the amateur gardener, where the cost of future maintenance is a serious problem, by drawing attention to certain ways and means by which the cost of upkeep may be reduced.

Many people, having built a house, or acquired an existing property, find that their capital is so seriously depleted that the construction or renovation and maintenance of their garden seems an insurmountable problem. They may perhaps also feel that their knowledge of horticulture and plants is so limited that anything they may do will be an expensive mistake. One must have great sympathy with such people, as their love of gardens may be no less than that of those better informed who are not infrequently apt to be patronizing.

There are, of course, many who feel that the joy of gardening largely consists in its vagaries. I am also aware, however, that too many people buy plants and expect them to function like machines. Should a plant die the nurseryman is blamed, and is expected to replace it free of charge.

The real gardener is the greatest optimist in the world. He is always hoping and waiting for the astonishing result, and if failure comes instead of success then he tries again with undamped enthusiasm.

Many people, keen to have an attractive garden, have neither the

time nor energy for continual pottering about among their treasures, and it is mainly to these that I trust my remarks may be of some service.

Nowadays, those who interest themselves in gardens are fortunate in the amazing collection of plants from which to choose.

In order to emphasize this point, let us consider for a moment the position in gardens say forty years ago. I remember being taken around gardens of importance in my childhood, when the contents of the glass houses were shown with pride—the vinery, the fruit house, stove, flower house, etc. The principal objects of interest outside, however, were mainly the bedding and the kitchen garden.

In those days skilled labour could be obtained easily and cheaply, hours of work were very long and general costs were a good deal lower than to-day. Now, simple maintenance is of great importance owing to the cost of labour and materials, and because of heavy taxation, so that one cannot afford to spend so freely. Further, modern transport has brought about a great change in our civilization since the war. No longer must one spend the majority of their leisure hours at home owing to the expense and inconvenience of travel. People are restless, and no longer want to stay at home, or indeed in any one place, to the same extent. Outside interests compete with our gardens, yet we want our attractive gardens just as much. Skilled labour is more difficult to find, and good men are no longer satisfied to work long hours for a mere pittance.

The question, therefore, is how to get the best result with the minimum of expense in labour and materials in the maintenance of our gardens.

In examining this problem, it is necessary to understand the basic principles which underlie the garden of easy maintenance.

I am assuming, of course, that soil preparation, planting, and construction are to be thoroughly carried out.

Firstly, then, the consideration of any particular site is of primary importance, as it may vary from a sandy soil on a slope facing south to a calcareous clay in the bottom of a valley. It will be realized, therefore, that the first necessity is to find out what classes of plants are most likely to grow naturally under any particular set of conditions.

The amateur often courts disaster, disappointment, and expense by trying vainly to grow plants unsuited to the site because he happens to like them. I feel very strongly that it is much more desirable to have our gardens inhabited by strong healthy plants, even if they are not all of the species we most favour, rather than to persist in trying to grow plants that merely exist. Personally, I prefer a healthy *Nasturtium* to a dyspeptic *Gloire de Dijon* Rose.

By observation of the natural flora of the vicinity we can often obtain valuable inspirations. There are choice species and garden varieties of many of the plants to be seen. From these observations also we may have a clue as to whether the soil is likely to be calcareous or lime-free. The degree to which lime is present or not can be found

by analysis, and such soil analysis is of great value, as it saves expense in applying unnecessary chemical fertilizers.

If one's garden is lime-free it is an easy matter to correct this where necessary should one wish to grow lime-loving plants.

In a limy soil, however, the cultivation of lime-haters presents difficult problems, as although beds and borders may be specially made up, they soon become poisoned by infiltration.

Since most plants are intolerant of a badly drained rooting medium, drainage requires to be attended to. Next to the selection of lime-lovers or lime-haters for our garden, I am sure that drainage is by far the most important consideration, more so than the degree of plant food available. It is far easier to grow plants in poor soils than in soils that are badly drained. Further, the ground may be flat or sloping, exposed or sheltered. All these points influence our selection of what to plant.

Having understood that the soil and site of our garden set certain limits on our selection of plants, it is necessary to consider how gardening operations can be reduced to the minimum. Here the question of design and use of material calls for special attention.

In every garden there are areas which require almost continuous cultivation, and others where periodic attention is all that is needed. For our purpose it is obviously necessary to reduce the former in area as much as possible, and to obtain our enjoyment from the latter.

The area of the garden which demands most attention is, of course, the kitchen garden. Here, if Brassicas and Potatos are purchased, the area for vegetables can be greatly reduced and only those crops should be grown which deteriorate rapidly after being gathered, and which cannot, therefore, be purchased in a fresh condition.

Next to the kitchen garden are the grass areas. These mean a good deal of labour, but thanks to the modern motor-mower large areas can be cut with ease and expedition. What, however, is even more important than the area of grass to be cut is its design. This should permit of the continuous forward movement of the mower. Odd corners, sharp pointed beds and narrow strips should be avoided. In handling a mowing machine a continuous forward movement covers a large area in a comparatively short time. If, however, one has to stop, pull the machine back, and make several more forward cuts, much time and labour is wasted.

I am of the opinion that intricately shaped beds have no artistic value. One often sees a rose garden, for instance, with intricate beds, but it would seem that when the roses are in bloom the eye is attracted to the flowers, and when the bushes are bare no one is interested in the rose garden anyway, and the intricate beds afford no form of garden decoration.

Beds in grass should, therefore, be simple in design, rectangular or circular, and so placed that the machine can pass from one to another without leaving odd corners to which it is necessary to return.

Further, an endeavour should be made to arrange for the various

grass areas to be continuous, even if connected only by a narrow grass path. This obviates the necessity of wheeling the machine over paths or loading it on to a barrow or carrier.

In order to keep the grass verges neat, it is necessary to cut them with a pair of edging shears. This operation can be made easier if the face of the verge is cut clean in the spring with an edging knife, so as to afford a smooth support for the blades of the shears. Further, it is necessary to see that the verge has a height of not less than two inches, otherwise getting the bottom blade of the shears under the grass to be cut is difficult and time-wasting. A straight edge should be so placed on the edge of the grass that a shaving of solid soil is removed. Only about half an inch is necessary, but this annual cutting will save hours of subsequent labour, and produce an infinitely neater edge.

Greater care is necessary in cutting curves, but the effort is well repaid.

Another method of rapid edging along the verges of gravel paths and drives is to fix an iron strip 2 inches wide by $\frac{1}{4}$ inch thick along the edge of the grass. The strip has iron spikes 6 inches long by $\frac{1}{2}$ inch in diameter every 4 feet riveted to it. The spikes are forced into the ground and the top of the strip lowered to just below the surface of the grass. The strips can be 10 feet or 15 feet long, and care should be taken to make the joints between the strips perfectly flush. As the grass grows over this iron strip a barrow can be run up against it, in such a manner that the iron-shod wheel is inclined and slightly at an angle, so that the wheel and the strip have the same result as a pair of shears, cutting the grass off as clean as can be done with edging shears. The barrow should be partly loaded to give extra weight on the wheel. As the iron is rusty on the surface it is inconspicuous.

The capital expenditure involved by this method may seem somewhat prohibitive, but once installed path verges can be edged as quickly as a man can walk, so that the capital outlay is covered in a very few years.

Where new lawns are to be made, it is a false economy to buy cheap seed, as this is chiefly composed of the common Bent Grass, *Lolium perenne*, which certainly gives a quick green sward on almost any soil, but the trouble is that when this grass flowers the second year it produces flower stalks like wire, which the best motor-mower refuses to look at.

If we have been foolish enough to save a shilling a pound on our seed, we must go to extra expense in dealing with the bents, and the only way that I know of is to cease mowing the lawn when the flower spikes can no longer be dealt with by the machine, and allow them to grow upright. Then is the moment to obtain a good scythe hand to go over the lawn and cut off all the bents. It will be found that the lawn must be left unshorn for about a week or ten days before scything takes place.



FIG 100 —PAVED BANK FOR ALPINES, NEEDING LITTLE MAINTENANCE.

To face p. 380.



FIG 101 — LITTLE BUT MOWING AND HEDGE CLIPPING IS REQUIRED TO MAINTAIN THIS FEATURE

The more expensive grass mixtures are composed of dwarfer, fine-leaved species, which cause no such trouble, so that it is an economy to pay an extra shilling or eighteen-pence a pound for our seed.

It is, of course, possible to reduce the area of grass to be mown, if the garden is large enough and the setting permits—utilizing areas away from the house, or forming vistas at a distance which can be seen from indoors—by having drifts of bulbs in the grass.

In orchards, or parts of the garden where there are scattered trees, bulbs can be planted in informal groups and drifts, and the grass allowed to grow, merely mowing narrow paths to connect seats, gates, summer houses, etc. After the bulbs are over and the foliage has died down, the long grass can be scythed down close, after which only occasional scything is necessary.

Another saving of labour in mowing can be effected by remembering to leave the grass box off the machine as soon as growth is slowed up by dry weather. This obviates the necessity of the removal of mowings, and a light scattering of grass acts as a beneficial mulch in hot weather, without being conspicuous or unsightly.

While on the subject of grass maintenance, the problem of banks deserves mention. Grass banks, unless of a very slight pitch, require considerable time and care to keep neat, and are much more suitably replaced by dry walls, which require little maintenance and afford the means of growing many beautiful Alpines.

In my opinion, rock gardens cannot be included as a feature in the kind of garden I am discussing, as, however charming and desirable they may be, they entail a good deal of work if they are not to become an eyesore. On light soil they may, in certain circumstances, be possible, but where the soil is on the heavy side they should be omitted.

Next in importance to the maintenance of grass areas comes that of the various beds and borders; they may be Rose beds, herbaceous borders or shrubberies.

The actual cultivation consists of the suppression of weeds and the aeration of the soil.

It is a good plan, in the spring, to let the first cultivation take the form of a shallow digging or "turning in" as it is called. As soon as the weed seeds have germinated, shallow spits of soil three or four inches deep should be turned completely over. This has the effect of killing the majority of weeds, and also aerating soil which has been left untouched throughout the winter. Further, it has the effect of loosening the surface so that the subsequent use of the hoe is made more easy and expeditious.

It is held by some that by growing plants sufficiently close to each other, so that their foliage covers the ground, weeds are suppressed. I feel, however, that the spacing must be such that there is always sufficient bare soil between the plants to allow of the free use of the hoe for aeration purposes.

With regard to shrubberies, the spring shallow digging should be carried out, followed subsequently by the occasional use of the draw hoe.

So far I have dealt with the necessity for choosing plants to suit the soil and site, and I have endeavoured to focus attention on the work required to maintain various areas, in their order of importance. Now I should pass on to what might be called labour-saving plants.

Plants may be divided into categories, according to the number of times they have to be handled.

The ideal plant for our purpose would be one that, once planted, required no further attention. Unfortunately, there are few plants of which this can truly be said. There are, however, many which come very near to this ideal, such things as Hardy Cyclamen, Japanese Anemones, Lily of the Valley, and many shrubs, which just hate to be disturbed. Going to the other extreme, there are plants that require to be handled every few months, and for these, of course, we have no time.

In order of value for our purpose I should choose flowering trees and shrubs, including, of course, Roses. Except for annual attention to any necessary pruning, and the occasional hoeing of the soil about their roots, they flower year after year and give a wonderful return to the harassed or indolent garden lover.

Next to trees and shrubs, I should consider that certain dwarf herbaceous perennials may be used. Perennials, if chosen at random, may involve much staking, tying, splitting up and replanting, so care in their selection is very necessary. Staking and tying if properly done requires much time, so our garden of easy maintenance must be an almost stakeless garden.

Following the labour-saving perennials come the Alpines, or so-called Alpines, for the decoration of the dry walls. Perhaps I should have placed this class of plant before the perennials, for as they grow in a drier position than in the herbaceous border they produce less growth and more or less look after themselves for years. Further, weeds are far less prevalent in dry walls than in the open ground.

Before proceeding to discuss the labour-saving plants themselves, I would say a word or two about garden paths—always a big problem.

Paths need much or little labour in maintenance, naturally according to the area they cover and to the way they are made, both as regards method of construction and material.

Paths may be either porous or have a waterproof surface. If the former, the drainage must be perfect so as to allow water to run directly through. Should weeds appear it is a simple matter to remove them with a Dutch hoe, or by the use of a suitable weed killer.

If of waterproof construction, they must be constructed with a camber or crown, and the path verges connected to efficient drains or soakaways at intervals.

For garden paths, the material used may be crazy or rectangular paving, brick on edge, or gravel paths bound with a bituminous

material. Nowadays, there are bituminous solutions which enable paths to be made, in which the bitumen is quite inconspicuous and in no way resembles the old macadam path.

The material used is, of course, governed by the purpose for which the path is required. It may be one which is purely utilitarian or one which forms part of the decoration of the garden. For purely utilitarian paths and those which have to support hard wear, nothing requires less maintenance than properly laid bituminous paths.

In any case, for our purpose paths should be reduced to the minimum, and so constructed that weeds do not become a problem.

For ornamental paths they may be either of crazy or rectangular stone, or brick on edge, and again a combination of both in pleasing design.

Paved paths may, however, become a nightmare when the seeds of grass and other weeds blow into the interstices and germinate. If the joints between the individual stones are rather thin, it is often extremely difficult to eradicate such weeds.

To obviate such a time-wasting and nerve-racking occupation, I suggest two methods of paving. The first is as follows :

Having set out the path to be paved, clean the ground thoroughly with a fork in order to remove the roots of any perennial weeds, then firm the ground by heeling and rolling, and level as if about to sow a lawn. The area to be paved should then be covered with a layer of clean sand about an inch deep upon which the paving can be laid in such a way that it is level and quite firm. Further sand should then be brushed over the surface of the paving, so that the joints are filled up. The joints should not be less than about a quarter of an inch wide.

The advantage of this method is that, if weeds appear, they root into the sand and can, therefore, be removed with ease. Further, it is the best way to lay paving where it is desired to interplant. Thymes, Acaenas, the varieties of *Campanula pusilla*, *Nierembergia rivularis*, Dianthus, etc., grow delightfully under such conditions.

The second method is to put down a layer of hardcore along the path line and roll or ram to a true surface, and lay the paving in cement. In this case the joints between the paving should be as thin as possible, and the surface brushed off with a stiff broom before the cement sets hard. This cleans the arrises of the stone and shows the joint, giving the appearance of dry paving.

I do not advocate planting in pockets in cement-laid paving, owing to lack of aeration and drainage.

In many gardens one of the great problems is that of hedges. I think that maintenance may be simplified if, before planting, the ultimate height of the hedge required is decided upon prior to the plant to be used being chosen. I am in this instance talking about formal clipped hedges.

For formal dwarf hedges 2 to 3 feet high, an excellent plant to use

is *Ligustrum ionandrum*. This has very stiff growth and small rounded dark green leaves, and can be used as a next step to box edging.

For hedges 4 to 5 feet high, *Lonicera nitida* is a most useful ever-green plant. It does not, however, grow particularly well in a limy soil unless it is moist.

Better still than *Lonicera nitida* is *L. yunnanensis* var. *ligustrina*. This is similar to the former, but has better foliage, and much stiffer, more upright growth. This plant, however, is not so available in quantity as *L. nitida*.

For the 6- to 7-foot hedge Thorn may be used, or a mixture of Privet and Myrobella Plum. By using 50 per cent. Myrobella Plum with the Privet, a much stiffer and very pleasantly mottled hedge is obtained.

Above this height—7 to 10 feet—a good hedge is formed of the Western Thuya, *Thuya occidentalis*. Holly and Yew also make perfect hedges, but are more expensive. Laurel also, if properly trimmed with secateurs, has few rivals where soil conditions are moist and situation shady.

For tall screens, 15 to 20 feet high, the Monterey Cypress, *Cupressus macrocarpa*, is an excellent subject, especially in the milder and moister districts of the west.

These suggestions are based upon the amount of clipping which various hedge plants will stand for many years without deterioration.

Healthy, well-maintained hedges form a very important item in garden decoration, quite apart from their necessity as windscreens and for purposes of seclusion.

I am aware that there are very many more plants most suitable for hedges. My point, however, is to emphasize the need for choosing the right plant for the height of hedge required.

Again, the size of trees should be carefully chosen, so that they may bear some relation to the size of the garden. Chestnuts, Poplars, Elms, etc., ruin many small gardens, having to be eventually lopped or removed, always an expensive and inconvenient procedure.

And now, for a moment or two, I propose to suggest a type of very charming garden in which flowers are only of incidental importance. I refer to what might be termed the all-green garden. Such a garden is of the easiest maintenance.

In the all-green garden we have an enormous range of shades to play with. We have also every size and texture of leaf. Compare, for instance, the black-green of *Ilex Aquifolium Hodginsii* with its large leaves, to the very pale green, delicate foliage of *Spiraea Thunbergii*.

The large pale leaves of *Catalpa bignonioides*, and the Irish Yew, form another outstanding contrast in colour and texture.

Let it not be thought that a green garden need be dull. Green is said to be the most restful colour to look at, and by careful choosing and blending, emphasized by proper attention to light and shade, the green garden can at one and the same time be a most restful picture and give pleasing gradations of colour.

Such a garden is composed of velvet lawns and handsome trees and shrubs only. Maintenance is reduced to mowing, annual attention to pruning, and cultivation in the form of turning in of the soil in spring, and periodic hoeing during the growing season.

Early in my lecture I stressed the necessity of finding out what classes of plants will grow naturally upon any particular site before spending money at random in purchasing plants of one's particular liking.

Unfortunately, time does not permit me to discuss many varied types of garden, or to deal with any particular problem that may be in the minds of my audience. I therefore propose to suggest a list of easily grown plants, setting myself rigid limits of choice.

The first limit is that they must not be fastidious as regards soil, providing it is not stagnant or waterlogged. They must grow in any reasonable medium that is not pure lifeless clay or pure sand. Actually, pure sand is not so difficult to furnish as might be expected.

Secondly, where trees and shrubs are concerned, little pruning after the first year must be necessary, except that which can be done by the veriest amateur.

Thirdly, except for standard trees, stakes must be unnecessary, and finally, they must be plants which keep to themselves and do not spread by means of suckers.

I commence, then, with a short list of trees suitable for the average garden.

Arbutus Unedo (the Strawberry Tree).—Although belonging to the Heath family, it does not object to lime, will stand wind and poor soil, and provides handsome fruit, flower and foliage.

Betula.—The Birches provide charming subjects of upright or weeping growth, with white or yellow or brown barks. They will grow in the driest and poorest of soils, and also stand in swampy ground.

Cornus Mas (the Cornelian Cherry).—Provides a haze of bright yellow flowers in February and March.

Cotoneaster frigida.—A pleasing small tree with handsome foliage and flowers, and bunches of bright red berries in the autumn.

Crataegus.—The Thorns may give us masses of flower, large shiny green leaves, conspicuous fruits and autumn tints—a truly obliging family. Personal taste suggests Paul's Double Scarlet, and the double pink form, for masses of flowers; *C. Crus-galli*, the Cockspur Thorn, for fruit and foliage; *C. prunifolia* and *C. punctata* for autumn fruit.

Diervillas, or Weigelas as they are popularly known, rather prefer a moist soil, and left alone will give a wonderful show year after year.

They may be had with dark red, deep pink, pale pink, white and yellow flowers. Personal choice would be 'Avalanche,' a fine tall pure white variety; 'Eva Rathke,' the darkest red one; 'Seduction,' a magnificent pink; and *D. Middendorffiana* with yellow flowers.

Hippophae rhamnoides is a species of Sea Buckthorn, which grows into a tree worth having. When in fruit it is a delightful acquisition.

Ilex.—The Hollies, too, are very accommodating, and grow well in a variety of soils, chalky or lime-free.

Those like *Hodginsii* and *camelliaefolia* have large dark green foliage, whilst there are fine forms with variegated foliage, such as 'Silver King,' 'Silver Queen,' *Watereri* and *aureo-marginata*.

Laburnum provides several good small trees that are easily grown, two of the best being *Vossii* and *Alschingeri*, although personally I always feel that the common *L. vulgare* has few rivals.

Maples.—In soils that are not too dry several of the Maples are very desirable: *Acer dasycarpum*, with silvery, deeply cut leaves; *A. Negundo variegatum*, with white variegation; and *A. Negundo californicum aureum* for golden foliage; *A. platanoides Schwedleri*, whose young foliage is bright scarlet; and *A. Pseudo-platanus* var. *Worleei*, with golden leaves. *A. platanoides* has attractive yellow flowers in spring.

Parrotia persica.—In well-drained soils this provides some of the most brilliant autumn tints.

Some of the *Pyrus* group seem to grow well in a large variety of conditions. Should there be lime in the soil, they seem to thrive in the most unpromising positions.

Sorbus Aria lutescens and *S. magestica* give us large silvery leaves, and *S. Aucuparia* fine red fruits, and its variety, *fructu luteo*, yellow fruits. *Malus floribunda*, the Japanese Crab, flowers with incredible freedom, and its red-leaved form is also desirable.

The Robinias have certain charming varieties, such as *Robinia Kelseyi*, with small racemes of pink flowers, and *R. hispida*, with much larger flowers and delightful foliage. The wood of these trees is, however, very brittle, and Robinias require a position sheltered from strong winds.

I feel that I must leave the subject of trees, although many more of the labour-saving variety could be mentioned, and pass on to a selection of shrubs.

Shrubs for our purpose are legion. I can, therefore, select only a few which I feel should be in every garden.

Commencing with the genus *Berberis*, we find an astonishing variety of beautiful shrubs, tall and dwarf, deciduous and evergreen, which will grow in almost any soil.

Berberis Aquifolium, in my opinion, is one of the most beautiful evergreens, with handsome foliage, large panicles of yellow flowers in the early spring, and in dry situations some brilliantly coloured foliage is frequently produced. *B. Thunbergii* is a deciduous species, and before it sheds its leaves the most brilliant autumn tints are to be seen—bright yellow, vermilion and scarlet, seeming to turn the shrub into a bonfire. Its variety *atropurpurea* gives us one of the most distinctly coloured shrubs for summer decoration, the foliage being rich red-purple.

B. Sargentiana is a tall handsome grower, with fine foliage and conspicuous yellow flowers.

B. verruculosa is a compact grower up to 4 feet, with small shiny evergreen leaves, curious by their white under-surface.

For berries, *B. polyantha* and its varieties are the most valuable. In *B. Wilsonae* we have a low-spreading bush, which in the autumn is laden with translucent opal berries.

Buddleias provide such lovely shrubs as *Buddleia alternifolia*, with arching sprays of scented lavender flowers, and *B. globosa*, a strong grower with handsome foliage and flowers forming golden balls. Of the species *B. Davidi*, there are varieties with long panicles of pink, pale lavender, and deep purple flowers. To get the best flowers, all that is necessary is to cut them down hard each spring.

In lime-free soils, the Callunas, or Lings, will grow in most places, even though it be a heavy soil.

Caryopteris Mastacanthus, a dwarf shrub, flowering in the autumn, is perfectly happy on a dry bank or in poor soil.

For those who like blue-flowering shrubs, this is one of the best.

The genus *Cistus* is a heavenly gift for those who only have a poor soil and suffer badly from possessing a wind-swept garden. Here, we have tall growers and short ones, which from the middle of May flower with incredible freedom.

Cistus purpureus, with flowers 4 inches in diameter, deep pink in colour, with a darker blotch at the base of the petal, a rounded bush growing to about 4 feet high; *C. Loretii*, a dwarf, with white flowers and a chocolate blotch; *C. algarvense*, with golden flowers and chocolate blotch; and *C. ladaniferus*, a stately fellow, with white flowers, chocolate blotch, and handsome evergreen foliage.

Colutea arborescens (the Bladder Senna) delights in poor soil, or will penetrate the stiffest clay. Its flowers are small and yellow and buff in panicles, and its curious inflated seed pods that go "pop" when squeezed are a continual source of joy to children.

For moist soils, several of the Dogwoods have either white or yellow variegated foliage, and some possess scarlet or yellow stems in winter.

Cotoneasters provide another genus of extremely varied shrubs. A tall evergreen variety greatly to my liking is *Cotoneaster salicifolia*. With shiny, fine elongated foliage, it has the added attraction of being literally laden with bright scarlet berries in the autumn. In contrast, *C. congesta* is a wee shrub, with bright green foliage and red berries, delightful where a tiny shrub is wanted. *C. Dammeri*, or *humifusa* as it used to be called, is quite prostrate, and will cover a bank with a most pleasing carpet, or if planted along the top of the wall will produce long growths which form a beautiful blanket of green, studded with berries of pillar-box red.

The desirable Cotoneasters are too numerous to mention, but the genus can be borne in mind as a most useful and easy-growing, labour-saving one.

Cydonia (the Japanese Quinces) can be obtained with flowers of scarlet, white, peach, orange and pink shades. Happy in poor soil, full sun, or on a north wall.

Providing the Brooms are carefully planted from pots in well broken-up soil, I believe they will grow in most places, sandy or clayey, good or poor soil.

There are a large number of varieties and species. My abbreviated choice is :

Cytisus praecox, the earliest to flower, and naturally compact, with a profusion of sulphur-yellow flowers. *C. scoparius Burkwoodii*, orange and red ; ' Dorothy Walpole,' rich crimson ; ' Lord Lambourne,' scarlet and pale cream ; and ' Maria Burkwood,' the darkest crimson of all.

Elaeagnus provides us with a fine foliage plant in *E. macrophylla*, with silvery-green leaves. *E. pungens aureo-variegata* is a fine-leaved variety, with golden variegation.

In light, non-limy soil, the Heaths give us flowers all the year round, and wind troubles them not at all.

Again, for soils that are not too heavy, the Escallonias are easy going. One called ' C. F. Ball ' has good foliage and scarlet flowers ; *Escallonia Iveyi*, handsome foliage, and large panicles of pure white flowers ; and *E. langleyensis*, carmine flowers, most freely produced. For western districts, *E. macrantha* makes fine hedges, and is also beautiful as a shrub in the open.

Of the genus *Euonymus*, I select the common Spindle Tree, *Euonymus europaeus*, and its variety *coccineus*, excellent for a moist, shady position.

Fuchsias are not grown as freely as they should be. *Fuchsia Riccartoni* is a delightful summer- and autumn-flowering shrub, with innumerable dangling scarlet and violet bells.

Genistas, for dry soils, light or heavy, are invaluable. *Genista hispanica*, a small prickly rounded bush, will almost grow on a doorstep—a dry bank is luxury. Several other varieties are available, both dwarf and tall.

For yellow flowers from July onwards the *Hypericums* fulfil our need. *Hypericum Moserianum* is for a ground cover or for a bank, which unlike *H. calycinum*, does not spread by suckers. Taller growers are *H. patulum*, and its varieties *Henryi* and *Forrestii*. All these have large flowers, and are very free flowering.

In limy soils Lavenders grow to perfection. There are tall and dwarf varieties, with white, pale blue or dark blue flowers.

Perowskia atriplicifolia is a valuable shrub for dry soils, with silvery leaves and spikes of pale blue flowers—a delightful combination.

Phlomis fruticosa (the Jerusalem Sage) is thought by many to be a handsome plant. It has grey, felted foliage, and spikes of yellow, sage-like flowers.

For poor, dry soils, the Potentillas, or shrubby Cinquefoils, are useful. *Potentilla fruticosa mandchurica* is a charming prostrate and spreading shrublet, with white flowers. *P. Veitchii* is a taller edition, and *P. pyrenaica*, or *prostrata*, gives us bright golden flowers. *P.*



FIG 102 —*GENISTA HAETNENSIS* IN DR STOKER'S GARDEN, LOUTHON



FIG. 103 —*KNIPHOFIA RUF*A IN DR. STOKER'S GARDEN, LOUGHTON

[To face p. 380.]

Vilmoriniana has silky foliage and sulphur-lemon flowers. Extremely free flowering, they make a splendid show from May to August.

Of the *Pyracanthas*, or Fire Thorns, *Pyracantha Lalandei* has scarlet berries in the autumn, larger and darker than the common *P. coccinea*, and *P. Rogersiana flava* is a free-fruited yellow form.

In light, poor soil, clayey loam in full sun, or on a north wall, the *Pyracanthas* always seem to have a good conceit of themselves.

As long as Rosemaries do not have to put up with wet feet, their diet does not trouble them particularly. The common Rosemary can be had with dark or pale lavender flowers, and also with white ones. A form called *pyramidalis* is erect growing, and can be formed into standards.

The Cotton Lavender, *Santolina Chamaecyparissus*, is a silvery-white compact shrub. I do not care for the yellow flowers, so I cut them out and grow the plant for foliage only.

When thinking of *Tamarix* for seaside gardens, I always choose the species *Tamarix hispida*, with its beautiful glaucous foliage and delicate pink panicles. To get the best results, cut the bushes down hard each spring.

The double form of Gorse will grow in pure sand or heavy clay, and seems to keep more compact than the common single one. Further, it does not produce seed.

I realize that in the foregoing list I have omitted such things as *Deutzias*, *Philadelphus*, *Lilacs*, *Rhododendrons*, and *Roses* generally. I feel, however, that to be grown well, all these deserve rather more consideration than we are inclined to afford.

We now come to our labour-saving Herbaceous Perennials, and here one must be careful. The plants must grow in most soils, have stems stiff enough to require no staking, and keep fairly compact. Although we have to exclude many lovely plants such as *Delphiniums*, tall *Michaelmas Daisies*, the taller *Phloxes*, *Lupins*, etc., there are still enough left, I think, to make an attractive border. A triennial lifting, splitting and replanting is, I believe, all that is necessary.

PLANTS WITH YELLOW FLOWERS.

Achillea clypeolata, has sulphur-yellow flat heads of flowers on stalks 18 inches to 2 feet high. An added attraction is the deeply cut silvery foliage. Flowers from June to September.

Helenium Bigelovi.—One of the earliest of the genus. The deep golden flowers have a black central cap. The plant is a good-tempered self-supporter.

Iris pumila 'Charmer'.—A little fellow with a large pale yellow flower. Growing 6-8 inches tall, it is a good thing for the dry hot edge of the border. Flowers in April and May. Prefers a limy soil.

Linum arboreum.—The beautiful golden Tree Flax. 8-10 inches.

Oenothera missouriensis.—A prostrate Evening Primrose with large

flowers of lemon yellow, 4-5 inches in diameter. Flowers from July to September.

Rudbeckia Newmanii.—A very free flowering and handsome plant with golden flowers having a jet-black thimble in the centre.

Solidago Virgaurea nana.—A dwarf Golden Wings, up to 2 feet, flowering in August.

Epimediums (in variety), with yellow or pink flowers on dainty spikes. Useful for shady positions and on account of their charming foliage; flowers in early May.

PLANTS WITH PINK OR RED FLOWERS.

Armeria boetica.—The tallest of the Thrifts, growing to 2 feet 6 inches, with heads of deep pink flowers $1\frac{1}{2}$ inch in diameter.

Armeria 'Bees' Ruby'.—Similar to the above, not quite so tall, but with flower heads perhaps a shade larger and darker.

A most interesting and useful novelty has recently become available by the production of a variety of very dwarf Michaelmas Daisies. These plants grow from 6-15 inches high and produce masses of flowers in dense panicles.

The following are varieties having pink flowers in varying shades:

'Nancy,' 9 inches; 'Venus,' 12 inches; 'Dorothy Vokes,' 15 inches; 'Countess of Dudley,' 12 inches; 'Daphne,' 14 inches; 'Marjorie,' 9 inches.

Sedum spectabile.—A very handsome plant with thick fleshy glaucous leaves and large flat heads of pink flowers, attracting every Peacock Butterfly within miles. The variety *atropurpureum* has darker flowers and reddish foliage.

Morina longifolia.—A curious and charming plant with a thick rosette of long shiny pale green leaves having very prickly margins. Spikes 2-3 feet high, with pale pink tubular flowers in whorls.

Erigeron glabellus 'B. Ladhams'.—A large Daisy-flowered plant up to 2 feet high with rose-pink blooms.

Gillenia trifoliata.—2 feet high with pretty rose and white flowers.

Papaver orientale 'Peter Pan'.—A modest form of the blatant Oriental Poppy with large crimson flowers on stalks 12 inches high. As far as I know, this variety does not annex the whole garden by its suckers.

Phygelius capensis.—Grows to 3 feet, with spikes of scarlet tubular flowers.

Kniphofia Macowani.—A dwarf Red-hot Poker with dainty pokers, $1\frac{1}{2}$ -3 feet high, orange-red in colour.

Dictamnus Fraxinella and *D. Fraxinella rubra*.—Pink and red varieties of the Burning Bush.

Gypsophila paniculata 'Rosy Veil'.—Makes a mound of innumerable tiny pale pink flowers; 2 feet high.

PLANTS WITH FLOWERS OF BLUE AND ALLIED COLOURS.

Anchusa myositidis.—Bright blue flowers in April and May ; 12 inches high ; will grow in a shady moist position.

Eryngium alpinum.—An Alpine Sea Holly growing 2 feet high, with blue stems and involucre and silvery-grey foliage.

Iris pumila atrocoerulea.—A dwarf Iris, 6-8 inches high, for a dry limy spot.

Linum narbonense.—A beautiful deep blue Flax, 18 inches to 2 feet high.

Ceratostigma plumbaginoides.—This difficult name probably accounts for the fact that this gorgeous Gentian-blue autumn flowerer is not grown in every garden. Quite dwarf, 9-12 inches, its foliage turns scarlet and orange as it finishes its job for the year.

Stokesia cyanea.—Gives a good show of mauvy-blue during the summer ; 12 inches high.

Veronica gentianoides variegata.—A May-flowering carpeter for the front of the border, with spikes of China-blue flowers ; 12-18 inches high. The foliage is prettily mottled with cream.

Salvia superba.—2½ feet high ; a very striking plant with dark green leaves and spikes of purple flowers.

Campanula persicifolia 'Pride of Exmouth.'—A sturdy Bell-flower 18 inches high, with double blue flowers.

Campanula carpatica 'Abundance.'—A fine dwarf Bell-flower, 9 inches high, with lilac-blue flowers.

Campanula carpatica 'Riverslea.'—A similar variety with deep blue flowers.

Statice brassicaefolium grandiflorum.—An amazing plant with normous heads 12-18 inches across of tiny dark blue flowers. The foliage is large and handsome.

Nepeta Mussini.—The Cat-mint. This plant will grow in almost any soil, but to get the best flower spikes there should be abundant lime in the soil. Indeed, the finest plants I have seen were growing in almost pure chalk.

Aster Thompsoni nana.—A very long-flowering, self-supporting Aster, with pale mauve flowers. Grows about 1 foot in height.

Aster 'Lilac Time.'—One of the new race of miniature Michaelmas Daisies growing only 9 inches high, with good lilac-blue flowers. A variety called 'Victor,' 6 inches high, has lavender-blue flowers, as also has one called 'Blue Bird,' 12 inches high.

PLANTS WITH WHITE FLOWERS.

Chrysanthemum maximum 'Esther Read.'—A new introduction which seems to be capable of standing up without support of any kind, with large flowers similar to a double white Pyrethrum.

Dictamnus Fraxinella albus.—A white variety of the Burning Bush, growing 2-3 feet high.

Campanula carpatica alba.—A dwarf white Bell-flower, very free blooming. The variety 'White Star' has much larger flowers and is in every way an improved form.

Libertia formosa.—In any lime-free soil, this plant forms a compact clump of dark evergreen grassy leaves, from which spikes of white flowers arise.

Iris unguicularis alba.—This likes a hot spot in poor soil, and is valuable for its early flowering.

The German Irises generally are labour-saving plants where the soil is dry and limy, as they dislike being disturbed. The varieties are, however, innumerable.

In giving the above lists of plants, I am conscious of their brevity. I feel, however, that they should serve to help those who feel that Providence has provided them with the world's worst garden.

Needless to say, the majority of the plants enumerated would not object to a better diet, but the fact that they will grow in poor soils and apparently hopeless places, makes them, to my mind, of particular value.

If, during the course of my lecture, I have been able to make acceptable suggestions for the easier maintenance of gardens, without any serious diminution of their attractiveness, I shall feel that I have not wasted the time of my patient listeners.

HYBRID RHODODENDRONS.

By F. C. PUDDLE, F.R.H.S.

[Read May 4, 1937; Mr. W. R. OLDHAM, J.P., in the Chair.]

THE magnificent show of hybrid Rhododendrons in the Hall to-day might easily convince us that Rhododendrons have almost reached perfection and that there is little more for the hybridist to do.

When we pass on to the species, however, and observe the abundance of excellent breeding material which they represent, we cannot fail to be impressed with the almost unbounded possibilities which are still open to enthusiastic plant breeders.

The earliest recorded hybrid in the Rhododendron Stud Book was either raised or flowered in 1817, so we may assume that the hybridization of Rhododendrons has been in progress for at least 120 years.

Thanks, however, to that brave and enterprising band of collectors who have, during comparatively recent years, introduced a wealth of new species into cultivation and thus provided a wider range of material for an ever-increasing company of enthusiastic hybridists, I think that I can safely say that the hybridization of Rhododendrons has advanced far more during the last twenty years than it did in the previous hundred.

I do not wish to underrate the good work which has been done by trade growers and hybridists in previous decades, and I am certain that their names will always have an honoured place in the history of Rhododendron breeding; but although trade growers have raised many excellent hybrid Rhododendrons which hold a valued place in our gardens, these are of little use to the hybridist, for, unfortunately, their pedigree has never been published, and in many instances they are distinct varieties rather than diverse hybrids.

The plant breeder who uses hybrids of unknown parentage in his matings is not only working in the dark, but he may unconsciously repeat a cross time after time.

There is really no need for any Rhododendron hybridist to waste his time in haphazard work, for the Stud Book issued by the Rhododendron Association is not only a guide to the breeder in his own experiments, but it provides him with a record of what has already been done so that he can avoid repetition.

Although the compilation of the Stud Book was only commenced in 1933, it already contains the pedigree of over four hundred hybrids, and, valuable as it is now, its value will still further increase as the experiments in hybridization become more complicated and we have hybrids in which a number of species are combined in a single individual.

The skilful hybridist never forgets the length of time which is required to prove each experiment, and he takes every precaution to avoid failure. It may be that he desires to improve the colour, or to breed new shades, or to increase the size of the flowers, or to develop a dwarfer, more compact, and perhaps hardier race of plants, but whatever his object he is constantly endeavouring to discover Nature's secrets, and from them to form theories for his own guidance.

Many years ago, when studying the problem of colour combination in its relation to plant hybridization, I tabulated the results which had been obtained in those families of plants which had been extensively worked upon by breeders, and I found that there was evidently a very definite sequence in Nature's scheme of floral colour, for they formed three groups, in each of which one of the three primary colours, blue, red, or yellow, was missing.

No. 1 group, in which blue is missing, includes Roses, Carnations, and Chrysanthemums.

No. 2 group is minus red, and Irises and Violas are good examples.

No. 3 group, in which yellow is absent, includes Sweet Peas and Pentstemons.

Although I made my original list about thirty years ago, I have not yet found it necessary to revise it, for in spite of the continuous efforts of plant breeders they have not succeeded in filling in these colour blanks. I am, of course, aware that varieties have been bred which have a suspicion of these missing colours, but they are sadly lacking in anything approaching the pure tone. The varieties of Roses and Carnations which have a suspicion of blue are usually produced by first-generation matings between crimson and white, and further progress appears so difficult as to be very improbable.

When we come to Rhododendrons it would appear that they provide the exception to the rule, for we already have red, blue and yellow species. When we look more deeply into the matter, however, and consider them from the hybridist's point of view, we find that for breeding purposes they form several distinct groups.

Botanists have divided what I might term the typical Rhododendrons into two sections which they term the Lepidote and the Elepidote series, the chief botanical difference being the presence or absence of scales on the foliage.

I doubt whether the botanists realized when they originated this classification how important and valuable it would prove to the hybridist, for the two sections do not readily interbreed, and, moreover, they have a different sequence of colours.

The Lepidote section, which includes the Maddeni, Triflorum, Lapponicum, Boothii, Saluenense, Campylogynum, Cephalanthum, and Cinnabarinum series, belongs to my No. 2 colour group, for, although both blue and yellow species are included in this section, there is not a clear red, or perhaps the better term would be scarlet.

The Elepidote section, which includes the Arboreum, Fortunei, Barbatum, Lacteam, Neriiflorum, and Thomsonii series, comes under No. 1 colour group, for here we have many good scarlet and pure yellow species but no clear blue. *Rhododendron campanulatum* is perhaps the nearest approach, but at its best it does not get beyond mauve, which is far removed from the lovely blue of a good *R. Augustinii*.

It is interesting to note that, although there have been many reputed hybrids raised between these two sections, I do not know of a single instance where the union could be definitely traced in the offspring.

The usual result of these matings is that, although offspring are produced, they favour the seed-parent and the influence of the recorded pollen-parent is undiscernable. The critic immediately expresses the opinion that other pollen has found its way to the stigma and fertilized it. Personally I doubt whether this is always the correct explanation, and I would suggest that it may be possible for the pollen of the recorded parent to cause a sexual disturbance which would form a stimulus to the reproductory organs, thus resulting in fertile seeds although the desired union is not complete.

This suggestion is not so illogical as it might appear, for such cases have occurred in the history of Orchid hybridization, and those who are familiar with the fertilization of Orchids will agree with me when I say that in their case the question of stray pollen upsetting an experiment in hybridization cannot arise.

The Azaleas may also be divided into two main groups, each with its own colour series. The deciduous section, which is chiefly represented by the sub-series Luteum, is perhaps the more widely cultivated in this country, and it will be readily realized that the colour series of this section corresponds with my No. 1 colour group. The colour range of the evergreen and semi-deciduous Azaleas contained in the sub-series Obtusum is, however, quite different and they have the colour sequence of No. 3 group.

A particularly interesting point now arises, for we find that the Elepidote series of Rhododendrons and the Luteum series of Azaleas are of the same colour sequence and, although of apparently remote relationship, they interbreed readily, and quite a number of hybrids have been successfully raised between them.

On the other hand, the apparently more closely related Lepidote and Elepidote groups of Rhododendrons are very loth to unite in wedlock, and the Luteum and Obtusum series of Azaleas are just as reluctant to form a union.

This suggests that there is more in Dame Nature's colour groupings than mere coincidence, and they probably have a more important bearing on plant relationships than we have realized.

The prudent hybridist who desires his experiments in plant breeding to show a fair margin of success is well advised to base his operations within the limits of these colour groups, but if he is more adventurous and endeavours to combine these distinct groups, he must be prepared to meet failures and disappointments.

If we look through the Stud Book and note the number of species which have been used in the production of hybrid Rhododendrons and compare this with the list of Rhododendron species which are in cultivation, we shall probably be amazed at the great possibilities which are still open to the hybridist even if he were content to limit his matings to the making of primary hybrids, but the enthusiastic breeder is unable to resist the desire to go further, for primary hybrids merely represent the borderland of breeding possibilities and they are only a foretaste of what may be achieved if a definite line is followed over a number of generations.

We might take as an example that lowliest of Rhododendrons, *R. radicans*, whose form and habits make it an ideal plant for the rock garden, but, unfortunately, it suffers from the fact that its flowers are of varying shades of that much-despised colour, magenta.

We cannot hope to improve the colour by crossing it with any of its close relatives, for all the species in the Saluenense series are of the same colour. To breed new colours we must therefore mate to another series.

We know that the Saluenense series will interbreed with the Lapponicums, for two hybrids have already been recorded—*R. prostratum* \times *fastigiatum* or more probably *impeditum*, and *R. saluenense* \times *hippophaeoides*. It will be seen that both of these hybrids are matings between magenta and lavender, and the best that we can hope for from such a combination is perhaps a pleasing shade of purple.

The yellow species belonging to the Lapponicum series offer better chances of breaking up the magenta colour of *R. radicans* and will probably produce both yellow and white hybrids. The primary cross, however, between *R. radicans* and *R. muliense* or *R. chryseum* would most probably produce a brighter shade of magenta or apparently the opposite of what we are working for—and here is where the inexperienced breeder is very likely to go astray, for he will probably be tempted to rest on his laurels, or scrap the whole lot of the plants and consider the experiment a failure. We must bear in mind, however, that although we have not secured the desired result we may be one step on the way, and these despised plants are really valuable breeding material.

The brightening of the magenta shade can easily be explained, for two important and distinct factors are responsible for the various colour effects in flowers, and we must take them both into consideration when arranging our combinations in breeding: these are the soluble or sap colours, and the insoluble which are known as plastids. The inheritance of the plastids is quite distinct from that of the sap colour, consequently they play a very important part in hybridization.

When we cross a magenta or mauve species with a yellow one, the insoluble factor of one parent is white and that of the other yellow, and it is these yellow plastids which are responsible for the brighter effect produced in the hybrid.

We have all, no doubt, noticed that magenta shades always look richer at night under the yellow glow of artificial light, and this is the

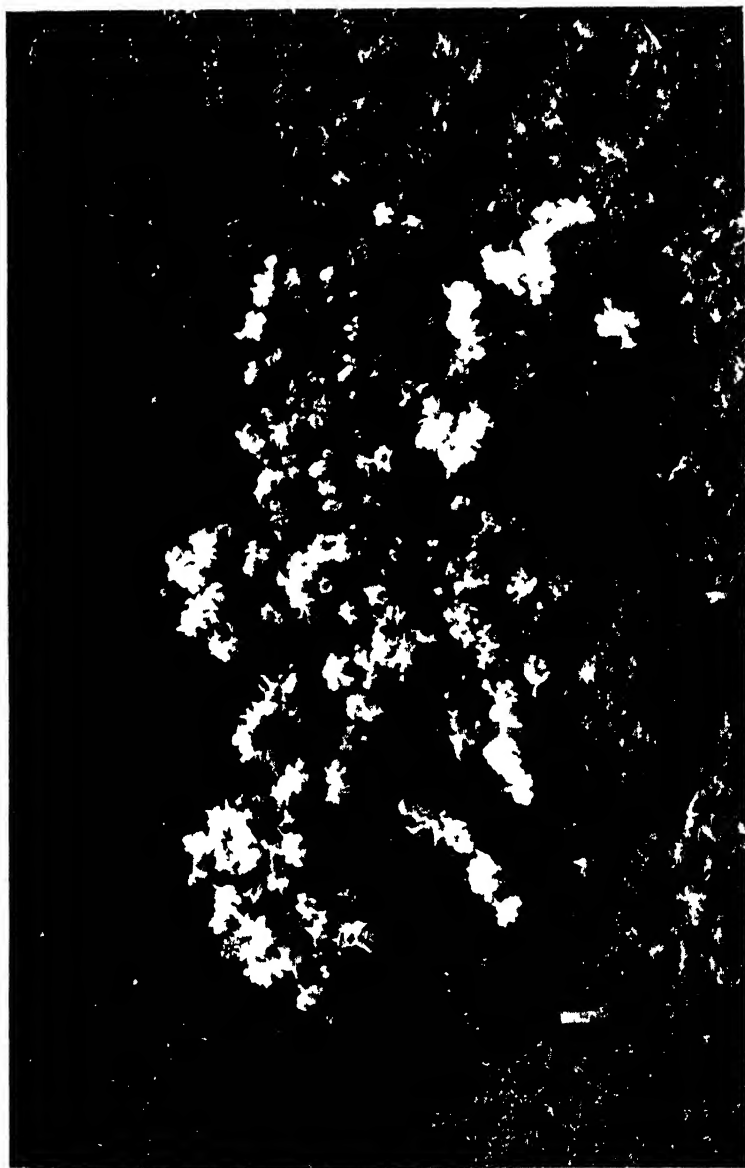


FIG 104 — RHODODENDRON NONPINENSE AT WISLEY FEBRUARY 1937



FIG 105 —*HEMEROCALLIS FULVA* ON A CHINESE SCROLL
PAINTING CIRCA 1350

effect which we have produced in our hybrid, although at the same time we may have reduced the density of the magenta sap colour.

In the second generation we can proceed with our efforts to breed a yellow hybrid from *R. radicans* in one of two ways :

- (1) By mating to each other in true Mendelian style the palest forms which we have produced in our primary cross.
- (2) By mating them again to the yellow parent.

The result of the first experiment would probably be that we should have a good number of plants of fairly correct habit, but a good proportion may still be of an undesirable colour.

In the second one we shall probably have a higher percentage of plants of the desired colour, but a lower proportion having the desired prostrate habit.

Personally I would favour the latter mating, because we can observe the habits of the plants at an early stage of their life, but we must wait until the plants flower before we can select them for colour.

In both of these second-generation experiments the yellow parent will probably dominate some of the offspring, and these may have flowers quite devoid of the magenta sap colour of *R. radicans*. They will then be either yellow or creamy-white according to the percentage of yellow or white plastids which they individually inherit.

If we made a similar experiment with the Elepidote section and endeavoured to produce a yellow hybrid from, say, *R. repens*, the results would not be quite the same, for we have the yellow insoluble factor in both parents and the result of the first generation would probably be a mere lessening of the density of the scarlet colour of *R. repens*. The second generation, however, would probably produce some pure yellows, but the creamy-white varieties suggested in the other experiment would be improbable, as, although some yellow species appear to have white plastids in their composition, in this case the yellow would be in the majority.

These examples are, of course, hypothetical, but they are based on my personal experience of similar combinations.

There are many dwarf species of Rhododendrons which hold great possibilities for the hybridist, and they might well prove to be the parents of the most popular hybrid Rhododendrons of the future. *R. Griersonianum*, *R. orbiculare*, *R. haematodes*, *R. dichroanthum* and other members of the Sanguineum group have already given proof that a race of charming Rhododendrons, excelling both in colour and form, can be bred by mating them to the best of the larger growing species.

There are also many fine species and indeed whole series which do not appear to have been touched by the hybridist, for their names are not to be found in the Stud Book.

The charming *Cephalanthum* series might produce some fine hybrids if a union could be effected between them and the Lapponicums.

The *Glaucum* series also contains some species of great promise,

and one wonders what the *Campylogynum* might breed under the guidance of a prudent hybridist.

The larger growing species may also develop into two distinct groups of hybrids: the one having close trusses of flowers which produce a mass of colour and appear at their best on the show bench; the other group having loose trusses of flowers which never look their best at a show, but are exceptionally lovely when daintily poised tier above tier on a large bush in the garden or woodland.

The future really holds great possibilities for the *Rhododendron* hybridist, and, although the breeding of plants may require patience, it is never irksome and the gradual development of the young seedlings is always full of interest.

The enthusiastic breeder is always gazing into the future, and he probably gets more real pleasure from his expectations than he does from his realizations, no matter how successful he may be, for he is never content to rest on his laurels and he sets himself an ideal, and, should he attain that, he immediately sets himself a still higher one—in fact, he is ever pursuing that elusive will-o'-the-wisp, perfection.

HEMEROCALLIS: THE DAY LILY.

By G. P. BAKER, V.M.H.

ALL professions, all industries, all plants, have their historical interest. When we come to search the writings of the early fathers of botany we find that the genus *Hemerocallis* (*hemera*, a day, *kallos*, beauty ; in reference to the flowers being fresh for only a day) generally known as the Day Lily, is a very old Eastern European garden plant, taking us as far back as the first century of the Christian era. PLINY the elder, a Roman, A.D. 70, whose *Natural History* is a compilation of extracts from some 2000 volumes, refers to the plant, but it is in DIOSCORIDES, a Greek physician, who lived in those early days and wrote a celebrated work on *Materia Medica* that we find, not only a description of the plant, but also the medical properties of the bulbous roots and leaves.* [See *Hemerocallis*, Dioscorides. Englished by Goodyer 1655, reproduced and printed in the atmosphere of Goodyer's style, by R. T. Gunther, M.A., 1933.]

The quaint old English translation is as follows :

Hemerocallis (some call it *Hemerocatalacton*, some *Lilium sylvestre*, some *Crinanthemon*, some *Porphyranthes*, some *Bulbus sanguineus*, some *Anticantharon*, ye Egyptians *Icroi*, ye Romans *Bulbus*, some *Lilium agreste*, some *Lilium marinum*, ye Africans *Abiblabon*) hath leaves and stalk like to ye Lilly, but green like Leeks, but ye flowers in threes or fours at every breaking out like in the cutting to ye Lily when they shall begin to gap, having a colour very like ochre, a root like to a great *Bulbus*, which being small beaten and drank or applied with honey in wool, is a Pessum drawing out water, and drawing out blood. But ye leaves beaten small being applied do assuage ye inflammation of ye duggs which come by childbirths, and of ye eyes ; and ye roots and ye leaves are applied profitably upon ambusta.

From the foregoing transcript it is evident that DIOSCORIDES was here describing the yellow variety, which many centuries later came to be known as *Hemerocallis flava* Linn. Not until the sixteenth century, when the first books dealing with garden plants were printed, was it recorded that this plant had found its way into the gardens of Western Europe. We owe the information to PENA and LOBEL in *Stirpium Adver. Nova*, 1570, who, under the name *Asphodelus luteus liliflorus*, describe it as having yellow flowers, angular capsules, and black seeds. Several years later we get the first European illustration of the plant in LOBEL's *Plantarum Historia*, 1576, who published a woodcut, showing an entire plant of the Lemon Day Lily under the

* THEOPHRASTUS, the Greek philosopher, fourteenth century B.C., whose work, *Enquiry into Plants*, has in recent years been translated by Sir ARTHUR HORT, makes no mention of the Day Lily, from which we may infer it was not then known.

name of *Liriophodelus phoenicus*, a single flower of a cinnabar red colouring, this plant being the *H. fulva* Linn. of to-day.

CLUSIUS in 1601, *Plantarum Historia*, referring to *Asphodelus*, p. 187, states that this plant was being grown in many gardens throughout Austria and Germany. GERARD followed with his publication in 1630, and he not only fully described the two plants then in cultivation, but quotes ATHENAEUS and DIOSCORIDES. The following is a transcript of much that he has to say :

(1) The Yellow Lillie hath very long flaggie leaves, chamfered or channelled, hollow in the midst like a gutter among the which riseth up a naked or bare stalk, two cubits high, branched towards the top, with sundry brittle arms or branches, whereon do grow many goodly flowers like unto those of the common white Lillie in shape and proportion, of a shining yellow colour ; which being past, there succeed three-cornered huskes, or cods, full of black shining seeds like those of the Peonii. The root consisteth of many knobs, or tuberous clogs, proceeding from one head, like those of the white Asphodill, or Peonii.

(2) The other Day Lily is of an Orange tawny colour. These plants bringeth forth in the morning their buds, which at noon is full blown, or spread abroad, and the same day in the evening it shuts itself, and in a short time after becomes as rotten and stinking as if it had been trodden in a dunghill a month together, in foul and rain weather : which is the cause that the seed seldom follows as in the other of his kind, not bringing forth any at all that I could ever observe ; according to the old proverb, " Soon ripe, soon rotten " : according to ATHENAEUS (A.D. 290) a flower which perisheth at night, and buddeth at the sun rising is fitly called *Hemerocallis*, that is, " Fair for a day."

It will be seen from the foregoing notes, as culled from the writing of the Greek physician DIOSCORIDES, that the lemon-flowered *H. flava* was not only known to the Greeks twenty centuries ago, but was also known to the Romans, the Egyptians, Africans, and other races whose names have disappeared from history. This fact is not without interest, and one naturally asks how came such a plant to Europe, which for centuries has been recorded as belonging to that continent, but which without doubt must have come originally from the Far East, China, or Japan.

Although we have no direct evidence how such a medicinal plant reached Europe, there were several sources to make us conjecture that it came by reason of the intercourse which was definitely established between the nations of the Far East and Europe as far back as Alexander's time, 300 B.C., when it is said that after the retirement of Alexander's army from India certain of his followers established themselves on the great Northern silk route.

From hints contained in the earlier Chinese histories, the recognized principal channel of trade between China and Syria was by way of Hekatompylos—Acbatana—Ctesiphon—Hira at the mouth of the Euphrates, the Persian Gulf, the Indian Ocean, where on the coast of Arabia it would connect with the incense trade route of Arabia to

Petra, Egypt, and so to Gaza, along the Phœnician coast to Tyre, Sidon, and so to Antioch, the capital of the Roman Colony in Syria; another from Petra would be the northern branch and go to Damascus and Aleppo. So long as the Parthians were masters of Arabia, Transjordan and Mesopotamia, direct trading between the Chinese and the Romans, by all routes was not allowed. (China and Roman Orient, HIRTH.)

From the earliest of time the traffic in the rich natural silks, medicines, and spices, whether by the overland route or by sea, was a great stimulus to urge adventurers to come from Syria and Europe. These Chinese products bore such high prices in Rome as to tempt the merchants to undertake the longest journeys and to undergo great hardships. (The Middle Kingdom, WILLIAMS.)

It is also known that under the reign of the Emperor Wu Ti, 140-86 B.C. of the Han dynasty, China became acquainted with the countries of Western Asia, and later extended its dominions as far as the Caspian Sea. Envoys were frequently sent to the realms of Western Asia. One such trade mission destined for Antioch, which in those early days was regarded by the Chinese as the capital of Ta-Tsin, reached the Persian Gulf, but turned back in fear of the long sea journey round Arabia, the length and danger of which seemed to have been vividly impressed upon them by the Parthians, who it would appear were already doing a considerable trade, chiefly in Chinese silks, with Romans established in Antioch and other cities on the Phœnician coast, and who, acting as middlemen, had no desire to bring the trade mission into direct commercial relations. The Chinese were not aware that the country they named Ta-Tsin was subject to a greater state. To them Antioch was the centre of the Empire, for Antioch, the "Queen of the East," possessed so much splendour of her own, that to the Oriental trader the distant grandeur of her superior rival was eclipsed.

At about the period under review, it is said by some writers that two of the seventy missionaries appointed by our Lord (Luke x, 1) were sent to China, Addai being one, and Mari the other. Such a bold enterprise could never have been contemplated unless the relations already existing between the Syrians and the Chinese were of the best, and of long standing.

Several centuries later, MARCO POLO tells of the activities of the Nestorian Syrian missionaries, whose existence in China enjoyed a great reputation on account of their skill, which brought them even into closer contact, in that they translated Greek medical works. He wrote that they may well be said to have covered the continent; their campaign was a deliberate conquest, one of the greatest ever planned by Christian missionaries. He bears witness that there were Nestorian churches all along the trade routes from Baghdad to Peking.

Turning now to the medicinal properties of the Hemerocallis, we find that the first mention of the plant appears in the Chinese Herbal Pen Ts'ao Yin Yee, compiled in A.D. 1116. Then followed the great repertory on Materia Medica in China, known as Pen Ts'ao Kang Mu

in the Ming dynasty, published in the second half of the sixteenth century, an enlargement of all former works on the subject, which begins with the Herbal ascribed to the legendary Emperor SHEN NUNG, 28 B.C. Pen Ts'ao Kang Mu is now the standard work, and considered by Chinese practitioners a book of the highest authority, and a model of pharmacological wisdom. Therefore, most of the drugs mentioned in this ancient pharmacopœia are still kept in store and sold for medical use, and are still known by the same names as they appear in that ancient book. (Journal Asiatic Society, vol. xxv, China Br.)

In this country the plant is known to possess very specific medicinal properties. We learn from Dr. DAVID HOOPER that the *Hemerocallis* used in China medicinally are *H. flava* and *H. minor*, and *H. graminea*, whilst *H. fulva* has been chemically examined and proves to contain Vitamins A, B, and C, besides protein, fat, and asparagin.

According to Dr. SUN CHUNG LEE, a Professor of Medicine in the Shanghai Chinese Medical College, the flower is the only part of *Hemerocallis* which is used as a food or in medicine. The effect of eating these flowers is to deaden all kinds of pain. It is given to women in childbirth. An extract of the flower is used as a cleansing or purifying agent for the blood, its effect being the evacuation of all foreign matter and poison contained in the blood through the kidneys. The dried buds of *H. flava* are extensively used in China as a flavouring in food. It is commonly known as Huang Hua Ts'ai and can be purchased at any food or medicine shop in Shanghai.

In concluding these historical notes of my subject, I am satisfied that there was far more intercourse amongst the peoples of the ancient world than is generally known. To give but one instance which comes from Zenob composed in Eyrinc, for he it is who records that two Indian chiefs rebelling against their king, fled westward with their clans and found shelter with the first Monarch of Armenia, 149 B.C. They were given a district on the upper Euphrates, and in the town of Ashtishat they set up the idols they had worshipped in India. Such a migration of more than 1000 souls and more than 1500 miles could never have been made without leave from the various governments through whose territories they would need to pass.

The flowers of *Hemerocallis* are extensively used as a food, and are regarded as a delicacy by the Chinese. They may be used fresh from the plant, but they are employed chiefly in a dried form.

In some parts, Day Lilies are grown as a crop plant for the yield of flowers. When dried they are made up into bundles and wrapped in paper for the retail trade, and sold in food shops under the names of Gum Tsoy, meaning golden vegetable, and Gum Jum, meaning golden needles.*

* * * * *

Day Lilies form a small group of some fifteen or sixteen species of hardy spring and summer blooming herbs, with lily-like flowers, of

* For further information see Jour. N.Y. Botanical Garden, vol. 34. no. 401 (May 1933), by Dr. STOUT.

simple cultural requirements, in any good garden soil, not overlooking that they are gross feeders if one wishes to secure the best from them in the way of foliage and flowers. They have more or less tuberous roots, linear or sword-shaped basal leaves and showy yellow, fulvous, or orange flowers in clusters at the ends of leafless scapes, the perianth segments partially united below to form a tube of varying length ; stamens and styles prominent. Propagated by division and sometimes by seeds, if available. Some of the species do not produce seeds in ordinary garden conditions. The foliage forming mats is useful as ground cover.

The Day Lily known for so many hundreds of years as a desirable garden plant has been much neglected in this country. Not so in the U.S.A., where with the assistance of Government and the Botanic Gardens, it has been popularized. In 1928 the U.S.A. Department of Agriculture published a fully descriptive and illustrated pamphlet for sale at the low price of 5 cents. A few years later the New York and the Brooklyn Botanic Gardens co-operated and staged an exhibition of the Day Lily at the Metropolitan Museum of Art, under the title of " Plant Forms in Ornament." Objects of art containing plant forms were exhibited together with such plants, flowers, specimens and illustrations as were available for comparison.

At about the same date, in 1933, the New York Botanical Gardens, under the guidance of the great expert of the genus, Dr. A. B. STOUT, planted a special display of Day Lilies comprising the known species, more than 100 named horticultural varieties, and numerous hybrids produced in the experimental section of the gardens.

How comes it that our friends on the other side of the ocean are so enthusiastic, whilst we in this country are so apathetic ? Is it because the Day Lilies are too easy of cultivation, too rampant, too evanescent, give an interrupted succession of fresh flowers every day for a whole month or more, and withal possess a delicious fragrance ? To quote from the writer in *New Flora and Silva*, " the truth is that we don't deserve *Hemerocallis* : we who reward good-nature with a sneer."

Those of us who do grow the plant recognize it to be good-natured, adapting itself to all locations, wet or dry, acid or lime, sand or clay, sunny or shady, in the herbaceous border, or on the banks of a stream, where it will luxuriate, adding grace and colour to its surroundings, and once established needing no more attention.

In this country the foliage of most Day Lilies dies to the ground with the approach of winter, remaining dormant till spring. In warmer lands many are evergreen. The flower colours of the species range through several shades of lemon-yellows to orange-yellows, and amongst the newer hybrids rosy pinks and reds are giving some very pleasing combinations of colours.

Whatever success in raising hybrids has been attained in this country is due to the untiring energy of the veteran mountaineer and Iris breeder, Mr. GEORGE YELD, who perhaps is the oldest amateur breeder of the genus in this country and America, and to Mr. AMOS

PERRY, who has remained ever faithful, having devoted many years to breeding, and to whom our gratitude is due for many of the newer introductions.

In recent years several new wild types, collected in China and Japan and sent to the United States, have provided excellent material for hybridization, with the result that a new race of fulvous reds have been produced.

Taking now the plants in the order in which the species were introduced into Europe :

M. flava Linn.—This lemon Day Lily was known in Eastern Europe in the early days of the first century A.D., and for four centuries has been a favourite flower in Central and Western Europe. It remains to this day one of the best, for there is no other yellow-flowered Day Lily of the same semi-robust stature that blooms as early in the season, with its sweet-scented flowers and flat veinless segments of a showy and distinct appearance. It has a wide distribution from Central and Southern Europe, eastwards to Siberia and Japan. It grows 2 to 3 feet high, having strong tufts of narrow deep green leaves, keeled behind and over 2 feet long. It is figured in Bot. Mag., t. 19, 1787, Addisonia, 14, 457, 1929, and by Redouté, Les Liliacées, vol. 1, t. 15.

An A.M. was given to this plant in 1931 and it is fully described in JOURNAL R.H.S., 57, p. 107.

It is recorded that *H. flava* of the Uralian Plains was from early times made into small mats by the peasants and Tartars to place under saddles. It was observed by PALLAS on the Upper Obi, becoming frequent towards the Yenisei, and westward is known to occur seemingly wild on the plains of Hungary and as far as Switzerland. It is termed *Lilium non bulbosum* by DODOENS, 204 (Spreng).

H. fulva.—According to LINNAEUS, this species is a native of China, but as a matter of fact its original home has never been determined. It has long been inured to our climate and few plants thrive better in any soil or situation, but moist soil suits it best ; its leaves on emerging from the soil, and for a considerable time afterwards, are of the most delicate green imaginable ; the appearance which the plant assumes at this period of its growth is, indeed, so pleasing that it may be said to constitute one-half of its beauty ; its blossoms, which appear in July–August, are twice the size of *H. flava*, of a tawny orange colour without gloss or smell, the petals waved on the edge ; the flowers are rarely or never succeeded by ripe capsules as in *H. flava*.

This species is a clone and has always been propagated solely by vegetative divisions—in other words, from the tubers, thus making it possible that all plants now in cultivation throughout several centuries were derived from one original seedling. Dr. STOUT suggests Europa Day Lily as the designation for this species, as being a triploid, and as such is subject to many irregularities in sporogenesis, and consequently almost completely sterile. While seeds have been obtained with this Day Lily as a parent in hybridiza-



FIG 106 —*HEMEROCALLIS NANA* GROWING WILD IN YUNNAN.



FIG. 107.—*HEMEROCALLIS FORRESTII* AT ROYAL BOTANIC GARDEN, EDINBURGH

tion, seeds by self-pollination are evidently not possible. The flowers are strictly day-blooming; they open after daylight and close about sunset. (For figures see Bot. Mag., 64, and Redouté, Les Liliacées, vol. 1, t. 16).

It was not till 1762 that LINNÆUS, who gave the genus *Hemero-callis* botanical rank, in his second edition of *Species Plantarum* published the names of *H. flava* and *H. fulva*, and they have since been universally accepted throughout the world. The two outstanding features of this plant are, first the fact that although this Day Lily has been in cultivation in Europe for so many centuries, its original home has never yet been determined. Diligent search and study amongst botanical and horticultural expeditions in China and Japan have failed to find an exact counterpart of the plant. These searches have not, however, been wasted labour, inasmuch as other valuable Day Lilies have been discovered which are destined to play an important rôle in the development of new red-flowered varieties, valuable for garden culture. The other feature characteristic of this *H. fulva*, that it does not produce seeds to any kind of self-pollination, has already been alluded to. Dr. STOUT thinks that probably this Day Lily arose as a single somewhat aberrant seedling, either wild or in garden cultivation, which attracted the attention of some Oriental gardener. It happens to have the habit of spreading vigorously by rhizomes, which make propagation easy, and has so maintained the individual character of the original seedling throughout several centuries in gardens. It is among the most robust of Day Lilies. It is only within very recent years that this plant has been used successfully in hybridization with other Day Lilies.

At the International Exhibition of Chinese Art, held at the Royal Academy two years ago, were to be seen two scroll paintings in colour on paper, lent by the Chinese Government. The one was by LU KUANG (fourteenth century) and the other by CHANG CHUNG, A.D. 1351. In both cases the artists made a leading feature of what undoubtedly is *H. fulva* (see fig. 105).

H. minor (syn. *graminea*).—PHILIP MILLER is credited with having given specific rank to this, the third Day Lily (*Gardeners' Dictionary*, Ed. 8, 1768). He described it as closely related to *H. flava*, but as being different in having shorter leaves, not more than half as wide as those of *H. flava* and scapes that rise only 1 and 1½ feet. Said to have its home from Eastern Siberia to Japan. It is readily recognized by its narrow, keeled, grass-like leaves. The sweet-scented yellow flowers tinged with green appear in June and July, the three inner segments being wavy.

This species of Day Lily, identified by TATARINOFF, has been known for ages as a drug or charm for dispelling grief, and is supposed to favour the birth of sons when worn in women's girdles; the root is diuretic and is given in dysuria, dropsy, jaundice and piles.*

* From *Materia Medica* and *Nat. History of China* for use of Medical Missionaries and native medical students. FRED SMITH, 1871.

H. disticha found its way from the Far East in 1798. It is a fulvous Day Lily, and is said to have been grown in the Camb. Bot. Garden in 1804. In 1823 a good description and coloured plate were published in the British Flower Garden, 1, 1st series, Plate 28, by SWEET. It did not gain favour with gardeners nor become a parent of seedlings either hybrid or otherwise. It is clearly evident that this was a Day Lily of a wild type that may be included with *H. fulva*, and yet quite distinct from the *H. fulva* of LINNAEUS, now known to be rather widely distributed in the wilds of China and Japan. Dr. SROUT points out a strange coincidence that DAVID DON in 1825 (Prod. Florae Nepalensis) lists under the name *H. disticha* a Day Lily which he reports to be growing wild in Nepal. DON had seen a mere reference to the *H. disticha* of JAMES DONN, but evidently did not know of the description and coloured plate published by SWEET. Since DON describes his plant as having yellow flowers it seems certain that he did not have a fulvous Day Lily.

An omission of the final "n," credited to DON, has in the past led to mistakes in connexion with the fulvous Day Lily.

H. disticha flore pleno.—In 1860 Messrs. VEITCH & SON were awarded the F.C.C. for this plant as a distinct herbaceous plant of showy character, obtained by the Rev. W. E. ELLIS from Mauritius. It was described as having two-ranked broadish linear leaves, and on tall scapes, producing several large expanding lily-like flowers of a fulvous orange colour marked with a deeper brownish-crimson central streak, quite full, the ordinary single perianth of the common form being here quadrupled.

The double-flowered Day Lilies in the colours of their flowers, in habit of growth, and in the diurnal habit of flowering, closely resemble the type *fulva*. *H. disticha flore pleno* was illustrated in Gard. Chron., 482, 1860. A year later a coloured plate figures in Floral Mag., 1, Plate 13. Here we have a flower that is much doubled.

H. fulva var. *Kwanso*.—The first record of this double-flowered Day Lily is due to KAEMPFER and THUNBERG. KAEMPFER was one of the first Europeans to reside in Japan. He published a work entitled *Amoenitates Exoticae*. Botanical nomenclature, as we understand it, did not exist at the time, and KAEMPFER adopted native Japanese names, where under Ken, Vulgo, Quanso, and Wafrigusa he briefly described the plant as *Iris hortensis latifolia, flore pleno magno coloris ignei*. THUNBERG, following many years later, was able to identify the plant from the word Quanso as a *Hemerocallis*, and as such it is now recognized as *H. fulva* var. *Kwanso*.

H. Kwanso foliis variegatis was introduced directly from Japan by VON SIEBOLD, and was illustrated in colour in Garten Flora, 15, Plate 500, 1866. It shows white-striped foliage and a flower somewhat less double than that of the plant introduced by VEITCH in 1860 (see also Gard. Chron., 1867, p. 292), where it is said to be "merely a variety of *H. fulva*, with the leaves more or less distinctly marked with

white stripes, and the tawny-red flowers filled out with a tuft of smaller petaloid segments in the centre."

H. fulva maculata.—It is a plant similar to *fulva*, with slightly different colouring in the flowers; the fulvous shades in the outer half of the opened flower are slightly paler, and the arching band across the mid-section of the petals is slightly darker. The flowers are larger than those of *fulva* and the petals are of a different shape. A coloured plate with description and statement of the history of this plant is in *Addisonia*, 14, Plate 460. Being triploid the plants set no seed among themselves, but it has been used in hybridization.

The origin of this variety is due to the Italian priest GIRALDI, who sent seed or living plants found growing in the wild near Shen-Si, China. Plants in due course came to the attention of Prof. BARONI, who described them as *H. fulva* var. *maculata* (*Nuovo Giorn. Bot. Ital.*, N5, 4, 306, 1897), *L. Sp. pl.*, p. 462.

It is said that this was the plant, according to CLUSIUS, 1601, being grown in many gardens throughout Austria and Germany at that date.

H. Thunbergii.—We owe the introduction of this pretty Japanese rather late-flowering Day Lily to PETER BARR (*Garden*, 4, 132, 1873). There is a detailed description in *Gard. Chron.*, 8, 94, 1890, based on plants then being grown at Kew, and later widely distributed. It has an excellent robust and compact habit of growth, attractive dark green foliage, and has been much used as a parent in hybridization. A coloured plate figures in *Addisonia*, 14, Plate 459, 1929.

A plant under the name of *H. Thunbergii*, from MESSRS. DEN OUDEN (1931) in Holland, was tried at Wisley and was highly commended. It is described in *JOURNAL R.H.S.* 57, p. 111, as vigorous, with narrow medium to dark green foliage, 2½ feet tall. Flower stems 3½ feet tall, erect, much branched near the summit, 12 to 24 flowered. Flowers 3½ inches diameter, short funnel-shaped, sulphur-apricot, deeper in the throat; scented, seeds sparsely borne in obovate capsules. Flowering very freely from July 3 to August 24.

H. citrina was collected in Northern Shen-si by GIUSEPPE GIRALDI, from China to Italy, about 1897. Here we have a Day Lily of distinctive characteristics. The flowers bloom at night; they begin to open shortly before sunset, are widely open during the night and then usually close early in the following forenoon, especially on warm sunny days. The flowers are on the large side with a long perianth tube, but segments are narrow. The colour is pale lemon-yellow; sepals greenish on the back and purplish at the tips, a feature especially noticeable in the bud; the foliage is coarse, 1 to 1½ inches wide and as much as 45 inches long, erect in growth but bending abruptly, dark green and dies quickly in late autumn. Flowers are fragrant, and their blooming period is midsummer and extends onwards in the year. Fully described and figured in *Bul. Soc. Toscana di Orticoltura*, p. 160, 1897, and figured in *Addisonia*, 15, Plate 482. In later years SPRENGER obtained seeds or living plants from Hupeh, China, but

these turned out to be less vigorous in growth than those first introduced from Shen-si (Gard. Chron., 36, 57, 1904). *H. citrina* has been much used in hybridization.

On the authority of Dr. L. H. BAILEY (Gentes Herbarum, 2, 143-156, 1930) Day Lilies fall into two groups, as determined by the mode of flower bearing: the forking or dichotomous group in which the flowers are borne in a more or less open or branched cluster terminating the scape; the involucrate kinds in which the flowers are close together and practically sessile in the head cluster, subtended by broad short bracts resembling an involucre.

H. Dumortieri comes within this last classification with a whorl of bracts surrounding the inflorescence. It is a semi-dwarf Day Lily, introduced in 1832 from Japan, and grown in Ghent, and described in 1834 as a new species and illustrated in a coloured plate. It has a red coloration of flower buds, narrow petals, a globose capsule and scapes that are mostly shorter than the leaves. It is one of the earliest to bloom, and of evil scent. It is illustrated by a coloured plate in The Garden, 1887, p. 280, and in Addisonia, 14, Plate 462, 1929.

There are in cultivation two of somewhat different forms, more dwarf than the type, under the names of *H. Sieboldii* and *H. rutilans*.

H. Middendorffii is another of the smaller Day Lilies resembling *H. Dumortieri* and sometimes confused with it, but readily distinguished by the shape of the petals, and the capsules, which are very different, whilst the scapes are taller than *H. Dumortieri* and more erect, and carry the flowers above the leaves. Leaves are of a medium dark green colour, 2 feet long and $\frac{3}{4}$ inch wide. It hails from the Amur and was introduced about 1856, and later grown in the Royal Botanic Gardens at St. Petersburg. The plant was made definitely known in 1866 by REGEL, with a comment, and illustrated in Gartenflora, 15, pp. 292, t. 522. The capitate head and bracts are there clearly shown. Flowers very late in the year.

The *H. Middendorffii* to get the A.M. in 1931 was described in JOURNAL R.H.S., 57, p. 109, as vigorous, forming dense clumps with medium yellowish-green foliage, 2 feet tall, deciduous; flower stems erect, 26 to 28 inches tall, just topping the foliage. Six to ten flowers in the capitate head with very conspicuous bracts. Flowers $3\frac{1}{4}$ inches diameter, almost cup-shaped, bright orange-yellow; seeds medium size, very freely produced in oval-shaped capsules.

A coloured plate figures in Addisonia, 14, Plate 463, 1929.

H. aurantiaca is a name given by BAKER in 1890 (Gard. Chron., 8, p. 94, 1890) to an orange fulvous Hemerocallis then growing at Kew Gardens. The origin was not known, but it was believed to have been received from Japan. From Kew it was distributed in Europe and America under this name of *H. aurantiaca*. It would appear that the plant described by BAKER did not agree with a wild type that exists in Japan and that it may even be of horticultural origin. Dr. STOUT, however, is of opinion that it may be considered the type of a species as he named it until there is definite knowledge to the contrary.

The plant as known stands with scapes about 3 feet high and extending well above the mound of leaves. The foliage is medium, coarse, strongly distichous, stiffly recurving, and decidedly evergreen in that it remains green and growing until winter ensues. The flowers are either sessile or on short stout pedicels. The open flower has a spread of about 5 inches. Classed as a fulvous Day Lily, it is, however, very distinct from *H. fulva*. Its scapes are shorter; the foliage is of darker green; the flowers are only pale fulvous, without reticulations, less widely open, and the segments are less broad. It blooms at the same time as *H. fulva*. It figured in *Addisonia*, 14, Plate 461.

Allied to *H. aurantiaca* is a plant described by BAKER (*Gard. Chron.*, 78, p. 62, 1895) as *H. aurantiaca major*, which came from Japan, where it was growing under conditions to indicate that it was a chance seedling by an accidental cross. It is somewhat similar to *H. aurantiaca*, but bears larger and finer flowers (*The Garden*, 48, p. 400, 1895).

The following small group of dwarf species have in more recent years been introduced into this country, discovered by the late explorer FORREST in N.W. China, in the mountains of Yunnan.

H. nana (fig. 106).—Habit dwarf, forming close clumps, with narrow dark green foliage, 16 inches tall. Flower stems the same height, outwards inclined, very closely branched near the apex, one to three flowered. Flowers $2\frac{1}{2}$ inches diameter, star-shaped, orange-chrome, reverse reddish-brown; petals narrow; scented. Flowering from mid-June. Raised from seed collected by FORREST, who described the plants as growing on stony moist pastures. An excellent photograph by him was published in *JOURNAL R.H.S.*, 57, 109, and a coloured plate in *Bot. Mag.*, t. 8968.

H. plicata (Stapf) is another of the same series, collected by FORREST in the Tali Range, 1896. Leaves in this variety are folded, 12 inches high, tapering to a point; flowers as many as five; bracts inconspicuous.

H. Forrestii (fig. 107) is another of the dwarf series, named after the explorer and collector, who found this variety growing on dry cliffs and ledges of cliffs in side valleys on the eastern flank of the Lichiang Range. It was first described by DIELS in 1912 (*Notes Bot. Garden, Edin.*, 5, 298), who reported the colour of the flowers as being of a deep reddish-orange. A later description, 1930, with coloured plate, appeared in *Addisonia*, 15, Plate 481, and gives it as a plant about 18 inches high and $\frac{1}{2}$ inch in width; the colour of leaves a medium green; the habit of growth ascending, recurving; scapes slender, ascending, but not stiffly erect, and in all plants thus far observed in bloom the scapes are shorter than the leaves. The flower colour is a uniform cadmium yellow. *H. Forrestii* has been much used in the U.S.A. for hybridization, producing dwarf Day Lilies of great promise and value for the rock garden and in the foreground of the mixed border.

H. exaltata (Stout) is a new species from Japan, fully described and figured in *Addisonia*, 18, Plate 595. Tall, stiff stout scapes, and robust

foliage with a resemblance to the more vigorous plants of *H. fulva*; crown compact; in the colour of the flowers, the shape of the petals, and the size and shape of capsules there is a resemblance to *H. Middendorffii*. *H. exaltata* is of itself not especially valuable or useful as a garden plant; the flowers are too small in proportion to the tall scapes and the robust size of the plant.

H. esculenta is described by KOIDZUMI in Bot. Mag., Tokyo, 39, p. 28, 1925, as being a Day Lily with pale red-yellow flowers, oblong rather than narrow segments, and scapes that are 90 cm. tall. In the colour of the flowers this plant seems to be a fulvous Day Lily, notwithstanding KOIDZUMI's opinion that it is allied to *H. Thunbergii*, which Dr. STOUT points out has no element of red colouring in the face of the flowers.

H. fulva longituba.—The plant here noted must not be confused with the long-tubed fulvous Day Lilies of MIGUEL and MAXIMOWICZ, which figured in Gartenflora, 34, 98, 1885. Here we have the same long perianth tube with the long narrow flower segments brilliantly coloured with an overcast of red on an orange ground. The plant is "from Kuling, in Kiangsi Province, China, and was collected by Dr. Steward growing in tussocks along the bank of a small stream in the bottom of a bushy ravine, altitude 3500 feet. The plants were sufficiently plentiful in the vicinity, so that our cook gathered the flower buds from time to time for use as a vegetable in our food.

"As a rule the perianth tubes are at least $1\frac{1}{4}$ inches in length, and the flower segments are from $3\frac{1}{2}$ to 5 inches in length, and seldom more than $\frac{3}{4}$ of an inch in the greatest width. The colour in the throat of the flower is orange-yellow with a stripe extending lengthwise through the segments; outside of this there is an overcast of fulvous red which is more intense at the base. But the exact colouring of flowers, character of foliage, and habit of growth is rather variable for the group of plants having the noticeable long perianth tubes." See coloured illustration in Addisonia, 15, Plate 483.

H. multiflora (Stout) is a species found by Dr. ALBERT B. STEWARD in 1925, growing wild in the bottom of a rocky gorge not far from a stream in Honan, China, and from living plants sent to the New York Botanical Gardens. Those that survived the journey proved to be quite distinct from any former Day Lily species. Dr. STOUT describes the crown branches as compact without spreading rhizomes; foliage is ascending, arching to a level of about 20 inches; scapes are slender, in most plants ascending, bending, much and finely branched, bearing in the entire season of bloom numerous flowers. The flowers are spreading, to a width of about 3 inches, colour of a shade of orange, the perianth tube is tinged green. Although it has a long season of flowering, the flowers are not noticeably numerous on the plant during the day. It is a species not especially valuable as a garden plant (Day Lilies, p. 34, by Dr. STOUT, 1934). A coloured plate is given in Addisonia, 14, Plate 464.

H. fulva rosea is of recent introduction from the wild in Kuling,

China, propagated by division. In the characters of the foliage, the scapes, and the capsules, it is similar to *H. fulva longituba*, without the long perianth tube, and in formation of flower the form of the type *H. fulva*. The special feature of this variety of *H. fulva rosea* is in respect to the colours of the flowers, varying from pink to bright shades of red. Dr. STOUT states that there is some variation in the precise shade of colour and in the intensity of the eye zone, in contrast to the duller and brownish fulvous colours more commonly known for the species. He also remarks that among plants having *rosea* flowers there is considerable variation in the shape of the flower segments and in the length of the perianth tube. It is reckoned that this type may be valuable in breeding new races of pink and red-flowered Day Lilies (Addisonia, 15, Plate 484, 1930).

PLANTS TO WHICH AWARDS HAVE BEEN MADE IN 1937.

Allium sikkimense. A.M. July 6, 1937. From Miss D. C. Hopton, Hagley Court, Hereford. One of the best of the blue-flowered Alliums, from north-west China. The foliage is grass-like, reaching to about 6 inches, whereas the flower-bearing stems are about double this height and carry a dense cluster of slightly nodding, lavender-blue blossoms which darken in colour somewhat with age. Figured in the Botanical Magazine at t. 7290.

Argemone hispida. A.M. July 6, 1937. From T. Hay, Esq., Hyde Park, London, W. 2. A very striking Western American herbaceous plant, stated to be perennial, and thus of longer duration than most of its genus. The erect stems bear grey, thistle-like foliage and leafy, cymosely-branched heads producing 10 or 12 flowers in succession. The flower is 4 inches across, usually 6-petalled, silvery white with golden stamens.

Border Carnation 'Harmony.' F.C.C. July 20, 1937. This variety received A.M. after trial at Wisley in 1937. Plant 2 feet tall, of vigorous, bushy habit and healthy foliage. Flower stems rigid, well branched. Flowers 2½ inches diameter with somewhat full centres, of good form, freely produced, clove scented, light heliotrope banded and striped with bright scarlet-cerise. Petals broad, entire. Sent for trial at Wisley and shown by Messrs. Allwood Bros., Wivelsfield Nurseries, Haywards Heath, Sussex.

Campanula arvensis var. alba. A.M. July 6, 1937. From Clarence Elliott, Esq., Stevenage. A free-flowering white form collected in Spain. The small heart-shaped, crenated leaves are not more than ½ inch wide; the flowers are produced 1 or 2 at the ends of very slender shoots, which may be upright or inclined outwards, and have 5 petals cut almost to the base.

Campanula carpatica 'Slaugham White.' A.M. July 20, 1937. From Mrs. Cuthbert Blundell (gr. Mr. S. Boyes), Haywards Heath. A seedling from *Campanula carpatica* 'Chewton Joy.' The plant is of erect habit and about 1 foot tall, bearing numerous large white bells.

Campanula × 'Clarence Elliott.' A.M. July 6, 1937. From Clarence Elliott, Esq. A hybrid raised by the exhibitor between *C. pusilla lilacina* and *C. isophylla Mayi* which leans more towards the latter parent in habit and flower characters. The trailing branches divide into a number of flowering stems, each of which produces 1 or 2 wide lavender cups whose petals may number from 5 to 8; the calyx lobes are linear, widely spreading, and less than half the length of the corolla.

Campanula incurva. A.M. July 20, 1937. From the Director, Royal Botanic Gardens, Kew. A handsome monocarpic species from

Greece, sometimes grown under the synonym *C. Leutweinii*. It is suitable for an elevated place on the rock garden, where the prostrate growths radiating from the central rosette may hang over a rock. The branching shoots bear broadly ovate, softly hairy, grey-green leaves and silvery-lavender flowers resembling large Canterbury Bells.

Chrysanthemum maximum 'Horace Read.' A.M. July 6, 1937. From Messrs. Daniels, Norwich. A fully double, Zinnia-like variety with large sulphur-white blooms measuring $3\frac{1}{2}$ inches across, borne on stiff stems. It is the latest development resulting from crossing and selecting varieties of *Chrysanthemum maximum* for many years by Mr. Horace Read, of Brundall, Norfolk. The flowers are excellent for cutting and remain in good condition for a long period.

Cornus canadensis. A.M. July 6, 1937. From Mr. W. J. Marchant, Keeper's Hill Nursery, nr. Wimborne. This excellent little woodland carpeting plant was shown bearing quantities of scarlet fruits which lend an additional value to its present garden worth. The species is a native of the United States as well as of Canada.

Crepis incana. A.M. July 6, 1937. From H. S. Boothman, Esq., Nightingale Nursery, nr. Maidenhead. A perennial plant from Greece, for the moraine or alpine house. The thistle-like leaves are grey and pinnatisect; the flowers carried on branching stems consist of ligulate ray florets only and are a very clear shade of pink, in other respects resembling a small Dandelion.

Helenium 'The Bishop.' A.M. July 6, 1937. From Messrs. T. Carlile, Twyford. A variety of Dutch origin with large semi-double, bright golden-yellow, somewhat spathulate, broad ray florets and dark brown globular cones. The flowers measure $2\frac{1}{2}$ inches across and are very freely produced on plants 3 feet tall.

Hypericum empetrifolium. A.M. July 6, 1937. From Dr. P. L. Giuseppi, Felixstowe, and G. P. Baker, Esq., V.M.H., Sevenoaks. Forming with age a humped mat of wiry, interlacing branches, this species from Greece and Crete is none too hardy in many parts of England and may require winter protection. The very numerous flowers are bright yellow and make up in quantity and a prolonged season for their small size. The figure in the Botanical Magazine t. 6764 shows a more upright form.

Jasminum \times stephanense. A.M. July 6, 1937. From Mr. R. C. Notcutt, Woodbridge. In this hybrid of *J. Beesianum* and *J. officinale* the flowers are much the same size as those of the latter parent, but the influence of *J. Beesianum* is discernible in their blush-pink colour. The hybrid is a climber of medium vigour, and when well established flowers abundantly.

Lilium \times Manglesii, Stooke's variety. A.M. July 6, 1937. From J. E. H. Stooke, Esq., Hereford. A very interesting hybrid raised from the cross *L. bulbiferum croceum* \times *L. tigrinum splendens*, which shows the influence of the pollen parent in the occasional production of stem-bulbils. The specimen exhibited bore ample foliage and 9 deep, orange-scarlet flowers, resembling in form those of the Tiger-lily,

Lilium × '**Orange King.**' A.M. July 6, 1937. From J. E. H. Stooke, Esq. The parentage of this robust hybrid is given by the exhibitor as *L. bulbiferum croceum* hybrid ♀ × (*L. Willmottiae* ♀ × *L. × cromoltiae*). The stem exhibited was over 6 feet high, covered in its lower part with linear leaves 6 inches long. The inflorescence consisted of about 40 well-spaced flowers on spreading stalks. The perianth-segments are broad, lustrous orange with darker spots, and slightly reflexing.

Lonicera × **grata.** A.M. July 6, 1937. From Mr. R. C. Notcutt. A vigorous and attractive hybrid Honeysuckle (*L. Caprifolium* × *L. etrusca*). The long, freely-branched, red growths bear comparatively large, broad-oblong leaves which are glaucous beneath. The flowers are deep rosy-red, white to ivory within, and are arranged in several whorls at the end of each branchlet, the lower in the axils of connate leaves.

Magnolia sinensis × **Wilsonii** ? A.M. May 25, 1937. From Major F. C. Stern, M.C., Goring-by-Sea. A very beautiful tree, probably of garden origin, closely resembling *M. globosa*. The leaves are 5 inches long, broadly elliptical in outline, pale green when young and covered beneath with silky hairs. The sweetly scented flowers are pendent, the white, concave petals obovate, 2½ inches long.

Nymphaea '**Rose Arey.**' A.M. July 20, 1937. From the Rt. Hon. the Earl of Jersey, Isleworth. This large, sweetly-scented Waterlily has flowers 5-6 inches across with petals of clear Rose du Barri surrounding a cluster of golden stamens.

Philesia buxifolia. A.M. July 6, 1937. From Dr. P. L. Giuseppi, Felixstowe. Introduced to Great Britain more than eighty years ago, and known to botanists in the previous century, this ornamental Chilean native has never been plentiful in gardens, being of slow growth and particular in its requirements. The lovely, solitary waxen rose-red flowers open successively for some weeks in the summer, and given a cool spot with a moist climate a large and widespread bush may be formed. Illustrated in the Botanical Magazine, t. 4738.

Phlox maculata. A.M. July 6, 1937. From T. Hay, Esq. A useful, early-flowering herbaceous Phlox of medium height, with narrow-lanceolate, glossy leaves and long, narrow panicles of deep, rose-pink, fragrant flowers. The specific name is evidently given in allusion to the conspicuous crimson flecking of the stem and branchlets.

Rhododendron × **cinnandrum** var. '**Tangerine.**' A.M. June 8, 1937. A cross between *R. cinnabarinum* and *R. polyanthum*; shown by Lord Aberconway, Bodnant, N. Wales, as a hardy flowering plant for general garden use. The narrow-tubed, trumpet-shaped flowers up to 3 inches deep and as wide, have large spreading lobes, pale apricot within, flushed deep rose without, becoming darker towards the base of the tube; borne in loose trusses of five or six. The ovate leaves, up to 3½ inches long by 1½ inch broad, are bright green and shiny above and rusty green below.

Rhododendron megacalyx. A.M. June 8, 1937. Shown by Admiral Walker-Heneage-Vivian, Clyne Castle, Swansea, as a flowering plant hardy in sheltered positions. Trusses loose, of five fragrant, deeply funnel-shaped, pure white flowers, up to $3\frac{1}{2}$ inches deep by as much across, the lobes spreading. Calyx lobes up to 1 inch long by $\frac{1}{2}$ inch broad, ovate-lanceolate, pale pink. Leaves oblanceolate, rugose, up to $5\frac{1}{2}$ inches long by 2 inches broad, dull green above, greyish-green below.

Rhododendron \times 'Romany Chal.' F.C.C. June 8, 1937. From Lionel de Rothschild, Esq., Exbury, Southampton. A hardy flowering shrub for general garden use, which received an Award of Merit when shown by Mr. Rothschild in 1932, and described in JOURNAL R.H.S., 58, p. xxxix.

Rhus Cotinus purpureus, Notcutt's variety. A.M. July 20, 1937. From Mr. R. C. Notcutt. A variety of the Smoke Tree with large, bloomy leaves of deep, vinous-purple. A very striking shrub, particularly when carrying its feathery inflorescences in late summer.

Rose 'Orange Triumph.' A.M. July 20, 1937. From Messrs. Henry Morse, Brundall. A very free-flowering, vigorous, semi-double Polyantha variety of German origin, raised by Mr. W. Kordis. The nearest approach to the colour of the flowers is geranium-red (Rep. de Couleurs).

Rose 'Poulsen's Yellow.' A.M. July 20, 1937. From Messrs. McGredy, Portadown. A free-flowering, hybrid polyantha variety of Danish origin raised by Mr. D. T. Poulsen. The flowers are rich yellow.

Saxifraga squarrosa. A.M. July 6, 1937. From Mr. P. Rosenheim, East Molesey. A true saxatile plant, making a hard green cushion like an Aretian Androsace, from which the slender flower stems arise 2 inches and support a corymb of 5 to 8 white flowers whose petals decurve as they age: a plant for the alpine house or scree, and one of the latest of its tribe to flower.

Verbena bonariensis. A.M. August 4, 1937. From C. H. Curtis, Esq., Brentford. A very useful perennial species from Buenos Aires, suitable for a place at the back of the herbaceous border. The slender, freely-branched stems attain a height of 4 or 5 feet and bear numerous terminal sprays of heliotrope flowers during July and August.

THE AWARD OF GARDEN MERIT.—XL.*

By F. J. CHITTENDEN, F.L.S., V.M.H.

218. PRIMULA JAPONICA.

Award of Garden Merit, July 5, 1937.

When it was introduced in 1871, *Primula japonica* soon took its place as the finest hardy Primula of its time. Three-quarters of a century later, in spite of the many new species that have been discovered and introduced from China in that time, the same is true. This is not because there are not among the later comers some more beautiful than *P. japonica*, but because, combined with a considerable share of beauty, *P. japonica* has perennial habit, perfect hardiness, wide tolerance of soils so long as they are moist, abundant production of seeds which readily germinate, and a range of colour from white through many shades of pink and red to purple.

P. japonica must have moist soil. It will even tolerate being under water for some weeks in spring, and still go on perfecting its ample rosette of leaves from among which arise the scapes with successive whorls of numerous $\frac{3}{4}$ -inch wide flowers standing out on stiff stalks in late April and May.

The plant is a handsome one, but *P. japonica* is seen at its best when grouped in scores or hundreds in the light shade of scattered trees in a damp wood or lining the moist banks of a shady watercourse, and when its various colours are mingled so that the dappled light and shade of the wood is repeated in effect by the varied shades of the Primula against the dark green of its foliage. Where it sows itself and care has been taken to destroy plants with streaked flowers or flowers of poor colour or shape, it provides a sight not easily forgotten and one that passes that acid test of the good in gardens, that we want to see it again, and yet again.

So it is in the wood at Wisley where the first owner of the garden, Mr. G. F. WILSON, planted it, and so it is in many another garden where Nature is permitted to play her part without being forced, and to mingle her colours with her own inimitable skill.

CHARLES WRIGHT first collected the plant, and ROBERT FORTUNE first secured seeds in Yedo in 1861. This seed failed to germinate and the plants he endeavoured to bring home were lost on the voyage. He later obtained seed from Mr. W. KESWICK of Hong-Kong and from Messrs. WALSH, HALL & Co. of Yokohama, and it was from this seed that Mr. W. BULL of Chelsea raised the first plants to flower in England

* The notes on the first hundred plants to receive the Award of Garden Merit have been collected from our JOURNAL, vols. 47 to 53, and published as a pamphlet, price 1s. For subsequent notes see vol. 54, pp. 218 and 423; 55, pp. 121 and 276; 56, pp. 80 and 245; 57, pp. 65 and 354; 58, pp. 171 and 400; 59, pp. 131, 308, 360, 406, and 449; 60, pp. 89 and 545; 61, pp. 94, 138, 225, 265, 298, 358, 393, 443, and 486; and 62, p. 134.

in 1871. Even at that early date variation was found, and the purple form which is regarded as the type and a lilac both received F.C.G. when shown before our Society in 1872.

The seed should be sown as soon as ripe in pots in a cold frame, the soil being kept moist, the seedlings pricked out into boxes and planted out into their permanent quarters when large enough to handle.

There is a good portrait of the plant in the Botanical Magazine, t. 5916.

219. GAYA LYALLII.

Award of Garden Merit, July 5, 1926.

The vast majority of the woody plants of New Zealand are evergreen. A few including Gayas and the nearly-related *Plagianthus betulinus*, *Muehlenbeckia australis*, *M. complexa*, *Carmichaelia grandiflora*, *C. angustata*, *C. odorata*, *Aristolelia racemosa*, *Discaria Toumatou*, *Fuchsia exorticata*, *F. Colensoi*, *F. procumbens*, *Olearia virgata*, *O. lineata*, *O. Hectori*, *O. odorata*, *O. fragrantissima* and *Senecio Hectori* are deciduous. Some of these are more or less evergreen in this country. Most of them succeed more or less happily in England, though all, including *Gaya Lyallii*, are apt to be severely damaged in bad winters, and may even be killed to the ground. The majority of the evergreen species are even less hardy here.

In spite of this drawback *G. Lyallii* is worthy of a place in any moderate-sized garden, save in the coldest districts. It forms a fairly large shrub, branching freely from the base, and of rather twiggy habit. The bark is smooth and pale, and may be peeled off in long strips, whence the New Zealand name of ribbonwood. The bright green ovate leaves are cordate at the base, drawn out to a rather long point at the apex, almost smooth and from 2 to 4 inches long.

This description applies to the form which occurs in the wet subalpine evergreen beech forests of South Island, New Zealand, but there is another species which forms part of the scrub flora of the drier steppes of the same island, with paler, broad-ovate leaves slightly lobed, truncate at the base, and with downy under-surfaces. This seems more hardy in this country, and is named *G. ribifolia* (by some *G. Lyallii* var. *ribifolia*).

The flowers of these two species are for horticultural purposes alike, and when they open in June and July in clusters of three (but the number varies from two to five) each, an inch and a half across, looking as though cut from white tissue paper, with many yellow stamens in the middle, and each pendent on a slender drooping stalk, they transform a very pleasing bush into a magnificent spectacle.

It has been figured in the Botanical Magazine, t. 5935, under the name *Plagianthus Lyallii*, by which name it is still often catalogued.

220. ACER GRISEUM.

Award of Garden Merit, June 8, 1936.

The genus *Acer* is a large one with representatives all through the North Temperate regions of the world. Few of its members are

commonplace. Most have some grace that entitles them to consideration for horticultural use. Some, like many of the Maples of N. America, grow to a size too large to permit them to be used in the moderate-sized garden, though they may well find a place in the large garden and the park. Others, like many of the species from eastern Asia, form only small trees, and *Acer griseum* is one of these.

Few of the Maples are worth a place in the garden because of their flowers, though the Norway Maple *A. platanoides* and the South European *A. Opalus* make a fine show in spring. Most are more worthy of consideration for their habit and their foliage, and *A. griseum* is one of these.

A few Maples mainly from the southern part of the range of the genus are not reliably hardy in England, but there is no reason to suppose that *A. griseum* is among them.

Some Maples, both of the Old and the New World, have peculiarities of bark which warrant their inclusion in the garden. *A. griseum* is among these, and of them it is the most striking, for the old bark, even in young trees, peels off in large thin flakes much as in some of the birches, and reveals the shining, smooth bright chestnut-coloured new bark beneath. It might be called the Cherry-barked Maple.

Add to these horticultural virtues of hardiness, comparative small size, good habit, pleasing foliage and beautiful bark (a virtue both in summer and winter), those of complacency as regards soil, and a fine autumn colouring of red or orange, and we have a tree well deserving inclusion among the plants to which the Award of Garden Merit has been given.

A. griseum has been known to botanists for half a century, but it was not until E. H. WILSON collected seed for Messrs. VEITCH in 1901 that it reached our gardens, and even then the supply was very limited. It has, however, produced seed in fair quantity in England, and this has germinated well, so that now supplies are becoming available, and soon no one who has a garden and values beautiful trees need be without *A. griseum*.

The leaves of most Maples are simple, though often more or less lobed, as in *A. palmatum*, but in the section to which *A. griseum* belongs they consist of three distinct leaflets. Its nearest ally is the handsome *A. nikoense*, and it was at one time regarded as a variety of that species, but in *A. nikoense* the leaflets are not, or only slightly, toothed and are half as large again as in *A. griseum*, where the terminal leaflet is about $2\frac{1}{2}$ inches long and about half as wide, the lateral ones being somewhat smaller, and all coarsely toothed. They are hairy and have rather a drooping pose on the tree, are green above and grey beneath. A figure of the leaf is given in JOURNAL R.H.S., 29, p. 360.

WILSON found the tree in Hupeh and Szechwan in Central China, where he considered it "the gem of all" the Maples. There he found a few trees up to 60 feet in height, but it has so far attained nothing like that height in England.

GARDEN NOTES.

The Earthy Scree.—In spite of shouts and protests, the laws of England still permit variation of the soil content of garden screes. Those who desire to cultivate the rarer, small, and more difficult Monocotyledons which require sharp drainage, and low herbaceous plants, inhabitants of stony soil but not of the scree, will find a stony bed a convenient growing medium for their purpose. Where there is scanty rainfall or bad drainage the "half-scre" on the flat offers all the advantages of the stony hillside, and a ready solution of many a garden problem. There is little room for weeds, which are easily disposed of.

Preparation for the scree should be on orthodox principles—excavations of the ground 3 feet deep, good drainage at the bottom and prevention of clogging. The rest is a heretic mixture, consisting of 50 per cent. soil mixed with 50 per cent. small stones, shingle or chips. The soil must be porous, but the choice is left to individual taste. Rocks should be placed in the scree for shade- and shelter-loving plants, and stepping-stones provided for working.

Amongst the plants suggested for this bed are the small and rarer bulbs, like *Narcissus* species, *Scilla*, *Fritillaria*, *Lilium*, *Nomocharis* and terrestrial Orchids, which seem to do well. Ground shelter should be provided by *Daphnes*, small *Rhododendrons* or other low shrubs. Plants reserved for the scree bed should be selected from those more difficult to grow, and those should be considered especially which are shy of flower elsewhere. Most *Gentians* will thrive and flower, including *Gentiana acaulis*.

Plants can also be established by direct sowing, and the bed will act as a perfect seed pan, only the wastage will be larger. Suggestions are the biennial *Iberis*, the small or more difficult *Violas*, *Aethionemas* and many Monocotyledons. Try *Lilium formosanum* and you will succeed. A scree of this description requires time to settle, and shrinkage in the level should be made good occasionally by additional material. When finished, top dress with granite chips to hide your deed and future blushes.

P. Rosenheim.

Leather-jackets on Lawns.—Mr. J. E. CHAMBERLAIN of Nailsworth, Glos., writes :

"In recent years we have been troubled with Leather-jackets on our Cumberland turf bowling green, and this pest got worse and worse, until in 1936 we were afraid we should lose the turf altogether. We tried all the poisons and chemical cures, but these only had the effect of destroying the grub after the damage had been done.

"As a last resort we decided, on the suggestion of my gardener, Mr. F. LUKER, of Council Houses, Avening, to put thirty or forty young

pullets on the green during the period when the flies lay their eggs. We kept a careful check on the chicken food and discovered that the fowls were only taking half the usual amount, the rest being found in fly. We provided a small ash-pit for them to scratch and bath in, and found that they did not scratch on the green at all whilst they could obtain plenty of fly. We kept the birds on the green from October 7 until November 3.

"When there was no more evidence of 'Daddy-long-legs,' the birds started scratching the turf, and we took them off. We made careful tests in June this year, flooding the turf and putting down large woollen sheets, but found that the ground was quite clear of grub.

"To give you some idea of the extent to which the green was infested, in mid-June 1936 we had got 36 two-gallon buckets of grub off the green, measuring 42 by 42 yards.

"This year our green is *playing better and looking better than it has done for ten years*, and we shall certainly repeat the treatment when the first sign of crane-fly appears; this would seem to vary slightly from season to season.

"It may be of interest to you to know that we have spent something like seventy pounds a year in labour and chemicals to eradicate this trouble, until this year when the treatment cost relatively nothing."

The York and Lancaster Rose.—In the very interesting and generous review of 'Old Garden Roses,' the Hon. ROBERT JAMES raises the question whether the name York and Lancaster should be applied to a particular variety, or if it is not, as Canon ELLACOMBE thought, a name for many striped Roses and therefore a group name.

The essential point about the evidence from SHAKESPEARE'S references is that his York and Lancaster had red, white and striped Roses on one bush. The only Rose which I know of to-day having this character is the Damask called York and Lancaster. I can find no evidence of any Gallica Rose having produced the three colours on one plant, nor do I know of any white Gallica Rose at all.

What makes the evidence for the Damask variety conclusive to my mind is that PARKINSON in 1629 used the name York and Lancaster for this variety alone, and the striped Gallica, *Rosa Mundi*, was not recorded by GERARD or PARKINSON, nor was it in TRADESCANT'S garden unless under another name.—E. A. Bunyard.

BOOK REVIEWS.

"Manures and Manuring." Bull. 36. Ministry of Agriculture. 8vo. 104 pp. (H.M. Stationery Office, London, 1937.) 2s.

This is the seventh edition of this useful publication. The question of manuring is dealt with from the agricultural standpoint, but the principles involved are similar to those of horticulture, and the methods of storing and treating natural manures are instructive.

"The Horticultural Note-Book." By J. C. Newsham. 8vo. xx + 418 pp. (Technical Press, London, 1937.)

This is not a new book, but a reprint without correction of a book published several years ago. It is a very useful book, but much of the information is becoming out-of-date and needs to be revised.

"Country Life Cookery Book." By A. Heath. 8vo. 253 pp. (Country Life, London, 1937.) 7s. 6d.

Not gardening, it is true, but how many products of the garden are wasted or spoiled when they are ready for food, some because of ignorance as to when they are ready, some because of some little thing amiss in their treatment on the way to the table. Here we have a good guide to these things, and a very readable one.

"Les Fleurs de Jardins." By A. Guillaumin. 8vo. xcii + 133 pp. (Lechevalier, Paris, 1936.) 36 fr.

A book of summer flowers with coloured figures and descriptive notes on cultivation and use of greenhouse plants, climbing plants and water plants. Descriptions of suitable houses and of heating and other garden apparatuses occupy the first part of this useful little book, and at the end is a polyglot list of names and an alphabetical index to the plants mentioned in the four volumes of *Les Fleurs de Jardins*, of which this is the fourth.

"Les Fleurs des Bois." By C. L. Gatin. 8vo. cxxx + 140 pp. (Lechevalier, Paris, 1936.) 50 fr.

An illustrated list of the flowering plants and ferns of French woodlands, with 96 figures in colour and several in black and white.

As in all the books of this series, notes on characters, habitats and uses of the plants named are given, and here they are preceded by an account of the families and the communities that go to the make-up of the herbaceous flora of the woodland. Some of the "*Noms Anglais*" quoted are interesting. We wonder how many know what plants are meant by Tasse Poison, Medicinal Tea, Sow Thistle (No! it is not the yellow-flowered pest of ill-cared-for kitchen gardens), Common Dwale, Blood-vine, Parkleaves and Adenostyle?

Botany. Catechism Series I, II. Elementary Genetics, Catechism Series. (Livingstone, Edinburgh, 1937.) 1s. 6d. each. Paper covers.

The titles convey the contents, and the name of the series the method of these little books. They cannot be regarded as introductions to their respective subjects. They are more of the nature of preparations for examinations where definitions are called for.

"The Plant Diseases of Great Britain: A Bibliography." By G. C. Ainsworth, B.Sc., Ph.D. 8vo. 273 pp. (Chapman & Hall, London, 1937.) 15s. net.

This book has been written in an attempt to provide, in concise form, the more important references to papers dealing with plant diseases found in Great Britain. These key references are intended to indicate the original literature, so that the

plant pathologist can quickly obtain detailed information on any particular disease.

A very large number of diseases are dealt with, arranged in sections, each containing diseases relating to a certain type of crop. Thus we get diseases of cereals, fodder crops, roots, vegetables, fruit, trees and ornamental plants, each in its separate section.

The references are mainly to papers that can be found in easily obtained publications, and so include most of the important papers published in this country, but foreign papers are mentioned where such provide the only description of a disease. Each reference is annotated to indicate the type and scope of the paper—this is undoubtedly a great help, no matter what a title may infer. At the end are two indexes, one of authors and the other of hosts and parasites.

The value of the book is difficult to assess, for although it contains much useful information it is by no means comprehensive. The trained plant pathologist has already at his disposal such valuable sources of information as the Review of Applied Mycology and the Ministry of Agriculture's Bulletins, and it is hardly likely that this book will replace these.

From the point of view of Horticulture the section on diseases of ornamental plants is incomplete, and does not include a number of plants commonly grown. One has to consider many horticultural plants which, though not grown as crops, are yet of great interest and extensively cultivated by amateurs.

The print is excellent, and the general layout makes it easy to turn to any particular plant disease, but the price is rather high.

D. E. GREEN.

"Annuals." By Roy Hay. 8vo. xii + 242 pp. (Country Life, London, 1937.) 7s. 6d.

Mr. Hay's book on annuals fills a gap that has been empty for some time. It is essentially readable, its form is good, the illustrations charming, and so craftily presented that the author shows one plants which look their best, when in one's own garden they have looked their worst with the "cussedness" that characterizes plants of all kinds when so minded. He is wise in advising the purchase of seeds from reliable sources, as many an amateur, in his desire for economy, buys cheaply—a most expensive thing in the long run as most of us have found out at some time or other when we have been rash enough to "do it on the cheap." Like a woman's clothes, it's far better to have a few good things, which look well to their dying day, than a wardrobe full of cheap trash that looks what it is after a few days' wear. In his opening chapter he gives us the names of many annuals that have somehow got left out of catalogues, and among them *Angelonia salicariaefolia*, which is indeed a loss, for I found it most useful in old days for pot work. In the second chapter he gives valuable hints on the cultivation both of hardy and half-hardy annuals, and I am glad he stresses the advisability of steam-sterilized soil, for it is a battleground that I have frequently fought over, always being told that "it takes so much time." But it does mean more or less freedom from weeds which otherwise have to be pulled out, often to the detriment of the seedlings. After all, given a sterilizer—as I have here—the garden boy, if he has even a modicum of intelligence, can look after it in the intervals of other jobs.

Praise be, too, that Mr. Hay doesn't sniff at annuals in the rock garden. He is right every time. Why should one not grow annuals in the rock garden and so save the drabness that may come when earlier things, such as small bulbs, are done? But they must be chosen with every care and regard for their suitability and dwarfness. There are indeed a great many among these which can only be shown satisfactorily in the pockets of a rock garden, such as *Gilia dianthoides*, and Asters such as *A. Bergeriana*, *A. adfinis*, and *A. fragilis*. I am afraid I cannot join in his praise of the Antirrhinum's Magic Carpet, etc. I tried the dwarf hybrids and thought them perfect little brutes to look at, giving the rock garden such a horrible suburban effect that I tore them out in a fury.

It is good to see the praise he gives Browallias, for they are not properly appreciated in many gardens. I wish he would give me the recipe for growing *Orthocarpus purpurascens*. I have seen it by the mile in Southern California, where it forms a gorgeous stretch of colour that in some lights is magenta, in others a glowing carmine, and I have tried it here sown *in situ*, in boxes, in pans, but nothing doing—and unless Mr. Hay will kindly send me some directions I shall adhere to my rule of trying a plant out three times in three different ways and aspects, and if it then refuses to answer out it goes, but *Orthocarpus* I should dearly like to succeed with. Another lovely plant he mentions is *Mimulus Fremontii*, which also will have none of me, though it may deign to germinate and produce one stray flower on a plant. I see he does not mention that other Californian *Mimulus*,

M. tricolor, which is also a little fiend, but so very beautiful *when* it flowers. I hope unwary amateurs won't go all out for the *Oxalis*, or they will spend more time than they can afford in rooting out the demons. The only well-behaved ones that I know are the bulbous South African *O. variabilis*, *O. polyphylla*, *O. hirta*, *O. purpurea* and *O. lupinifolia*, which stay put and don't trespass over the whole garden. It is good to see *Sanvitalia procumbens* in this list, for I have been amused to find that not one person in ten, and many of them expert gardeners, have known the little gem when they see it here. It is a plant that should be widely grown, as it has every qualification for popularity among the dwarf-growing annuals.

Another admirable point in Mr. Hay's book is the derivation of plant names given in every case. This to the average amateur is of inestimable value, as quite possibly—like mine—his Latin and Greek may be more noticeable by their paucity than their fluency. In many cases the origin of the names is amusing as well as instructive, and proves to the non-gardener that after all there is some reason for the outlandish tongue-twisting names that he jibs at as "silly."

I only have one minute bone to pick with Mr. Hay. He is writing of Annuals, and surely he should not include in them so many perennials, even if they do flower the first year from seed. An annual according to the dictionary is a "plant which springs from seed, flowers and dies within the course of the year." That is my only bone—not more than a merrythought—though, to be broken between us when we meet, as I hope we may, when I can congratulate him in person on having given the gardening fraternity—amateur or professional—a most excellent and informative book.

VISCOUNTESS BYNG OF VIMY.

NOTES AND ABSTRACTS.

Primulas, New, from the Himalaya, Tibet, China and Burma. By W. W. Smith (*Notes R.B.G. Edinb.*, vol. xix, pp. 167-178; 1936).—New species described are *Primula Barnardoana* (F. K. Ward 11616) of S. Tibet, *P. consocia* (F. K. Ward 11814) of S. Tibet, *P. dictyophylla* (F. K. Ward 1533 and 9993) of Upper Burma, *P. flabellifera* (F. K. Ward 11949) of S. Tibet, *P. Huana* (H. T. Tsai 51854) of W. China, prov. Yunnan, *P. hyacinthina* (F. K. Ward 11800) of S. Tibet, *P. Tigmediana* (Ludlow & Sherriff 397) of Bhutan, *P. Ludlowii* (Ludlow & Sherriff 554) of Bhutan, *P. Moorcroftiana* var. *flavida* (Ludlow & Sherriff 1482) of Kashmir, *P. pusilla* var. *flabellata* (Ludlow & Sherriff 725) and *P. sikkimensis* subsp. *subpinnatifida* (F. K. Ward 11931) of S. Tibet. *P. Ludlowii*, which has flowered in cultivation, is close to *P. Sherriffae*, having a similar long and slender corolla tube to its pale lilac-purple flower, but it is smaller, without meal on the corolla, and the corolla tube is finely hairy outside and in; it grew naturally in wet moss on an overhanging cliff.—W. T. S.

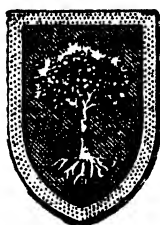
Sempervivum Studies, 2 [*Sempervivum tanulmányok*, 2]. By J. Domokos (*Kert. Tanin. Közl., Bull. Roy. Hungarian Hort. College*, II. pp. 38-41; 1 text fig. 1936).—This paper contains observations supplementary to Praeger's *Sempervivum* (1932) based on plants recently collected in Hungary and the Banat and grown at the Royal Hungarian Horticultural College, Budapest. Several new forms are described. *Sempervivum Schlehanii* var. *dimorphum* Domokos (p. 38) differs from typical *S. Schlehanii* in its smaller dimorphic rosettes, 6-7 cm. across, open in summer, closed in winter, with the linear green red-tipped shortly and abruptly acuminate leaves tightly overlapping, as well as in its less branched inflorescence on a stem 20-25 cm. high and narrower and more acuminate petals which are rose and 2 mm. broad; it was collected in the Tokaj-Hegyalja mounts, Hungary. *S. Schlehanii* var. *tokajense* Domokos (p. 39), from the same locality, differs from *S. Schlehanii* type in its narrower leaves (to 1 cm. broad), which are pale green, not brown-tipped, and broadest in the upper quarter, and in its smaller habit and narrower, paler 2 mm. broad petals. *S. banaticum* Domokos (p. 39), from the Banat on Mount Treskóvác, has open rosettes to 10 cm. broad, with linear leaves abruptly contracted at the tip, in spring or summer brownish-red, glabrous (therein distinct from *S. Schlehanii*) with ciliated margins, 4-5 cm. long, in the upper third 1.5 cm. broad; stem leaves densely short pubescent; inflorescence to 30 cm. high; flowers to 2.5 cm. broad, 13-14 parted; calyx-segments densely glandular pubescent, acuminate; petals lanceolate, ciliated at the margin, densely glandular pubescent below, glabrous above, white with a broad pale rose median stripe (therein distinct from *S. tectorum*); filaments densely pubescent at base; anthers rose; carpels green, pubescent, with rose stigmas. *S. Degenianum* Domokos (p. 40) is a hybrid, *S. banaticum* × *S. ruthenicum*, found on Mount Treskóvác, with rosettes 8-10 cm. broad, open, with leaves like *S. banaticum* but broader (to 2 cm.) brownish-red, densely white tomentose above and below, inflorescence and flowers as in *S. banaticum*, 13-15 parted, with rose to red streaked petals and anthers pale rose or yellowish. *S. brunneifolium* (Praeger) Domokos (p. 40), from Mount Stara Szevinicza, was described by Praeger as a form of *S. Schlehanii*, but is here considered a distinct species. *S. hirtum* v. *glabrescens* f. *dentata* (p. 38, with fig. p. 41) has 2-3 large teeth on the upper part of the leaf and is a teratological modification not hitherto recorded in *Sempervivum*.—W. T. S.

Vegetable Propagation of Tropical and Sub-tropical Fruits. By G. St. Clair Feilden and R. J. Garner (*Imp. Bur. Fruit Prod., Tech. Com.* 7; 66 pp., figs.; June 1936).—A general introduction on vegetative propagation is followed by a list of tropical and sub-tropical fruits, with brief notes on the methods of propagation which have been found successful, together with a reference to an article dealing with them.—F. J. C.

Woolly Aphis Control. By R. M. Greenslade (*Imp. Bur. Fruit Prod., Tech. Com.* 8; 88 pp.; Oct. 1936).—A review of the published information regarding the woolly aphid, *Eriosoma lanigerum*, is followed by a description of the insect and its habits and of the effect of climate on its incidence. The methods of control advocated in various countries are reviewed, but no thoroughly effective measures applicable to all cases have been found. The parasite *Aphelinus mali*, of which much was hoped, has not proved effective in England. An extensive bibliography occupying 60 pages concludes the paper.—F. J. C.

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MASTERS LECTURES, 1937

THE PLANT AND ITS WATER SUPPLY.—I.

By Prof. E. J. SALISBURY, D.Sc., F.R.S.

[Read March 9, 1937; Sir A. W. HILL, F.R.S., V.M.H., in the Chair.]

BUT a few years ago anyone dealing with the subject of the relation of water to plant life would have considered himself under no necessity of defining what was meant by water, but to-day the position has considerably altered. Whereas a quarter of a century ago we thought that water was a simple substance consisting of two atoms of hydrogen and one of oxygen, to-day we are confronted by an increasing complexity in our concept of this medium, and the fundamental importance of water for plant life demands that the horticulturist should know all that science can teach him as to its nature.

It seems probable that water from condensed steam does in fact actually contain a large proportion of the H_2O of our earlier conception, and this too represents an appreciable proportion of rain water. Much of the ordinary water that we drink is a polymer consisting of two H_2O groups linked together, the so-called Di-hydrol; whilst the water from melted ice consists largely of Tri-hydrol in which each molecule contains three H_2O groups. Ice itself probably contains $H-H_3O_3$ groups linked together.

Has this, you may well ask, any significance for the horticulturist, or is it a theoretical concept that has little if any bearing on practical experience? It is perhaps yet too early to give a conclusive answer, but experiments upon plants watered with condensed-steam water on the one hand, and with melted-ice water on the other, produced

growth which was much better in the culture receiving the water largely consisting of the Tri-hydrol. But, in view of the known effect on plants of minute traces of various salts, it must be recognized that the observed differences may have been due to the presence of these in different proportions according to the previous history of the water containing them.

The widespread belief amongst practical gardeners that plant growth is greatly benefited by heavy falls of snow may therefore quite possibly be well founded, for the melted snow yields water with a high Tri-hydrol content. At the same time it must not be forgotten that melted snow is not pure water and when evaporated to dryness yields a residue which, *inter alia*, is radioactive; but this is true also of rain water.

However, the complexity of water by no means ceases here. With the discovery of heavy hydrogen of mass 2, the so-called Deuterium, came the recognition of the existence of heavy water or Deuterium oxide (D_2O), though in a normal water sample this occurs in the proportion of only one part in 6000 to 9000. Various investigators have obtained evidence that the proportion of D_2O affects plant growth.* Still more recently comes the discovery of yet another hydrogen isotope, of mass 3, termed Tritium, which occurs in ordinary water in a proportion of about seven parts in ten thousand million. Also there are minute traces of water in which an isotope of oxygen, of mass 18 instead of 16, is involved. But as this isotope is normally present in only about one part in 10^{50} of water it is extremely improbable, though not impossible, that this has any significance for our present purpose.† The fact that some fruits, notably Pineapples and Tomatos, yield fluid that contains a significantly higher proportion than usual of "heavy water" indicates the plant's selective capacity, and the possibility that substances present in extreme dilution may be accumulated and become of biological significance.

Experiments on growing plants supplied with "heavy water" indicate a deleterious action when this water is present in relatively high concentrations, but a stimulating effect when dilute. When we remember that many substances which, even in weak solutions, are normally poisonous to plants, but act as stimulants in very dilute solutions—when too we remember the astonishing effects of extremely minute traces of vitamins on the growth of animals—we shall, I think, hesitate to regard even the extreme dilutions we have referred to as of no conceivable significance for the plant world. But perhaps at

* Growth of the mould *Aspergillus* would appear to be stimulated by D_2O . G. J. MELOR found no differences in growth of Wheat embryos, though he employed a wide range of concentrations of D_2O (Proc. Soc. Exp. Biol. Med., 82, 79, 1934). T. C. BARNES (Science, 79, 370, 1934) found that the flagellate *Euglena gracilis* divided more rapidly when grown in water containing one part of D_2O in 2000—that is to say, in an appreciably higher concentration than in normal water. The same investigator concluded that the alga *Spirogyra* lived longer in water containing a higher amount of heavy water (0.47 per cent.) when exposed to light, but not when in the dark.

† Water involving the isotope of oxygen of mass 17 is present in even smaller quantities.

present the most important aspect of these discoveries for us is that they emphasize the complexity that often underlies the apparent simplicity of natural phenomena, and that even so familiar and seemingly uniform a medium as water presents many problems as yet unsolved.

The remarkable properties of water which give it its unique significance for plant growth are partly chemical, as, for instance, its neutral character in the pure state, and partly physical, as its importance as a solvent. It is probably owing to the polymerizations previously referred to that whereas in other liquids there is a continual increase of density with decreasing temperature, in the case of water the maximum density is attained at $4^{\circ}\text{C}.$, and thus we have that unique characteristic that the coldest water rises to the surface and the solid ice is formed at the top and not at the bottom of our ponds and lakes ; this property is of fundamental importance for the growth of many submerged aquatics, since in all but the shallowest bodies of water the deeper layers do not usually cool below $4^{\circ}\text{C}.$ ($39^{\circ}\text{F}.$). Apart from the gradual increase in volume which occurs with falling temperature below $4^{\circ}\text{C}.$ the abrupt expansion when water changes from the liquid to the solid state is only too familiar in its manifestation of burst water pipes—an effect that is sometimes paralleled also in the tissues of plants, where ruptured cells are beyond the aid of any “plumbing.” For though, when water at $0^{\circ}\text{C}.$ turns into ice, it only expands by about an eleventh of its volume, yet the comparative incompressibility of water renders even this increase of great moment.

But we owe to these same volumetric changes another phenomenon familiar to gardeners, namely, the frost-lifting of plants when a sharp frost follows rain. I have occasionally seen arable fields in which Dandelion roots and Dock roots had been lifted out of the soil on such a scale, from this cause, as to suggest a wholesale weeding operation. Unfortunately, the effect is too often manifested in relation to our more cherished possessions. Under the conditions mentioned, free expansion of the soil is only possible in an upward direction ; it follows that the increased volume, resulting from the freezing of the water-logged soil around the collar of the plant, forces the surface slightly upwards. Thus the root is raised a trifle out of the ground and water from the soil below is drawn into the space between earth and root. This water in turn freezes and the process continues, so that there is a progressive wedging upwards of the plant until finally we find the root lying on the soil with its tip in the cavity from which the major part has been withdrawn. Not the least important virtue of surface dressing with ashes, stone chips and the like is that by their loose texture they prevent water-logging of the upper layers and so check the ice formation around the collar of the plant which might initiate frost-lifting.

It has been shown that some strains of Lucerne, owing to the structure of their root system, resist frost-lifting, whilst other strains succumb, and such differences may well obtain amongst horticultural species and varieties also. Unfortunately too little knowledge is

available as to the relative susceptibility of plants to this type of injury and too little as to the root systems of different strains.

It is not my purpose here to treat in detail of the chemical and physical effects of water within the plant; it should, however, be emphasized that variations in the character of rain water are quite appreciable, whilst river and well water, which we sometimes utilize, exhibit a wide range of composition, and these differences are too often overlooked when we try to apply the cultural practices of one area to another.

Any perusal of analyses of water from various sources will convince us of the wide range presented in respect both to total content of dissolved salts and the proportions in which these are present. But despite this, very little attention has been paid to their different effects when used for watering plants. The modern tendency towards the artificial softening of water may have very important implications both for plants and the animals which feed upon them. Unfortunately water analyses usually deal only with the more abundant salts and ignore the minute traces of the rarer elements present.

It should be emphasized that a number of different investigators have shown recently that minute traces of many of the rarer metals are to be found in plants and that, moreover, the presence of these substances in very dilute forms in the soil solution has a distinct beneficial effect on plant growth. Thus SCHARRER and SCHROFFE have demonstrated the beneficial effects of minute traces of wolfram. SHIBUYA and HIDEAKI found that Tomatos benefited by minute traces of vanadium, whilst YOUNG obtained increased growth with traces of a great variety of the rarer elements. Indeed, in some instances it has been found that the absence of even such small quantities as are normally present in soils can lead to serious physiological disturbances.* But, even when the plant itself does not seriously suffer, its value as a food for animals or man may be markedly diminished. The recent discovery that the sheep staggers of Australia is a consequence of the absence of minute traces of cobalt from the herbage on which they feed, is a salutary reminder that the chemical or physical treatment of water may bring evils in its train greater than those it is intended to remedy.

So, too, it is important for us to remember that the proper balance of salts in the solution available to the plant may have a marked effect both on the general health of the plant and upon its fertility.

It is not my intention, even if time would permit, to deal with every aspect of the water relations of plants, but to consider more particularly those of especial interest to the horticulturist, namely, the absorption of water and its loss from the plant's surface, over both of which we can exercise a certain amount of control. Nevertheless, to avoid too one-sided a picture may I remind you that water plays a

* Boron deficiency causes heart rot of Sugar Beet, although only one part in a million suffices for healthy growth. Mottle leaf of Citrus is caused by zinc deficiency, and healthy growth in culture solutions is obtained with one part in two millions. Yet as slight an increase as to five in a million is markedly injurious (cf. A. R. C. HAAS, Bot. Gaz., 98, 65, 1936).



FIG. 108 —*CARIANTHRA* SHOWING CAPSULES OPEN IN DAMP ATMOSPHERE



FIG. 109 —*CARPANTHIA* SHOWING CAPSULES CLOSED IN DRY ATMOSPHERE

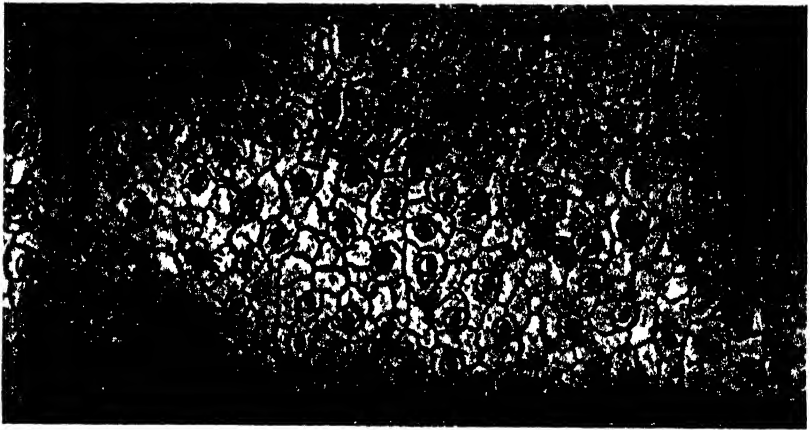


FIG 110—LOWER EPIDERMIS OF MARSH PENNYWORT (*HYDROCOYLE VULGARIS*) GROWN IN DAMP SOIL x 60

Note large epidermal cells and larger less crowded stomata (74 175 to the sq inch)

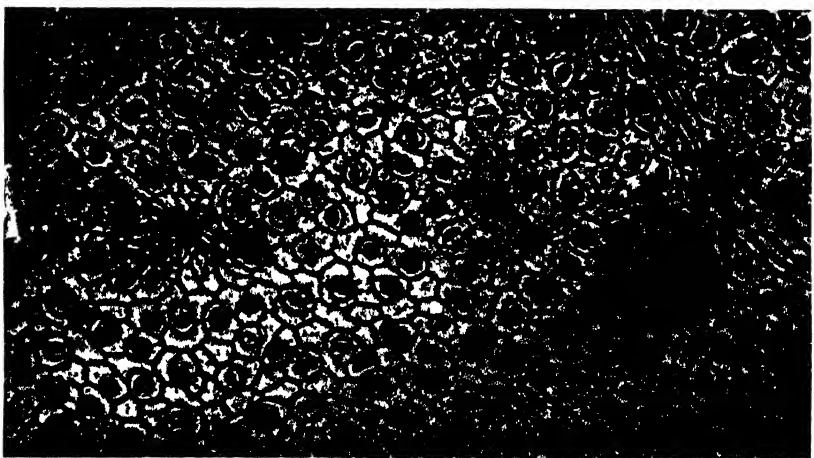


FIG 111 —LOWER EPIDERMIS OF MARSH PENNYWORT GROWN IN DRY SOIL x 60

Note smaller and more crowded stomata (165 765 to the sq inch)

prominent part both as an actual solvent and as a swelling agent in imbibition. Imbibition water may exert a powerful influence in the cell, the effects of which are most obvious in hygroscopic movements of living or dead tissues.

The opening of the flowers of *Silene* at night and their closure during the day is, for instance, determined by changes in humidity. Again, the opening of the capsules of many species in dry air and their closure when the air is moist is well illustrated in the fruits of the Cowslip. That movements of this character represent a definite specialization is, I think, emphasized by the fact that some plants of arid regions have capsules which remain closed during periods of drought, whilst they open and shed their seeds in conditions of moisture favourable for germination. Instances are furnished by South African members of the Aizoaceae such as *Carpanthea* (figs. 108, 109).

We are all familiar too with the hygroscopic parachutes of the Dandelion and Salsify fruits, which, by remaining closed in damp weather but spreading open in dry, ensure dispersal of the fruits in the most favourable circumstances. Similar parachutes occur on some seeds, such as those of the Willow Herb.

Loss of water is essential to the splitting open of the stamens in the flower, whereby the pollen is shed. This loss of water, operating on a subepidermal layer of cells with thickenings like the ribs of a perambulator hood, brings about contraction in a plane at right angles to the long axis of the stamen and thus leads to longitudinal splitting and the release of the pollen grains.

Water, too, is necessary as a medium for the free-swimming male cells of such plants as the Ferns, the Liverworts, the Cycads and the Maidenhair tree, which brings to our notice the fact that the power of free movement from place to place is not a prerogative of the Animal Kingdom alone, and indeed is shown by some of the simpler algæ throughout the greater part of their life.

Various plant movements are dependent upon changes in turgor, as, for example, the remarkable response of the leaflets and leaves of the Sensitive Plant to various stimuli, or the movement of the stamens of *Centaurea* when touched.

These instances are but a few of the many ways in which water plays a rôle more or less significant in the life of the plant.

The enormous importance of water to plant life scarcely needs emphasis, for not only is more than 90 per cent. of the softer parts of green plants composed of water, and even seeds contain about 10 to 16 per cent., but water, as we all know, is one of the raw materials from which the food of a plant is built up. Actually, less than 1 per cent. of the water absorbed is used for photosynthesis, and not more than one-third at most is usually retained in the plant body.

The water needs of the plant are not evenly distributed throughout the plant's life history, but there appear to be two main periods when the demand is greatest, namely, in the seedling stage and during the phase of development immediately prior to flowering. Thus at

optimum water content of the soil B. N. and B. R. SINGH (Proc. Indian Acad. Sci., iv, 376, 1936) found that the water consumption at these periods was about twice that in the intervening stages. The statistical analysis by R. A. FISHER of the effectiveness of varying rainfall upon the growth of Wheat seems to point in the same direction (Phil. Trans. Roy. Soc., B, 218, 89-142, 1924) and to suggest that the periodicity in requirement is little affected by the conditions of nutrition, although such conditions profoundly influence the total amount of water utilized.

Deficiency in water supply is one of the greatest dangers to which plant life is subject. It is therefore of considerable importance to the cultivator of plants to understand precisely the manner in which the supply is maintained and the sources from which this supply is derived.

Ultimately the water supply of the plant is derived from one or other of the various forms of precipitation, sometimes as snow, dew, or mist, but very largely as rain; yet, as we know, rainfall is intermittent, whilst the demands of the plant are continuous. Indeed, the seasonal distribution of rain may be more important than its amount. Hence the soil can be regarded as an intermediary, a sort of sponge-like reservoir, holding and regulating the available water for the plant. The horticulturist must therefore apprehend the factors which determine the water-retaining capacity of the soil. The water is held upon the soil particles as films occupying a variable proportion of the pore space between the solid materials of the soil. Some of this film is in such intimate contact with the soil particles that it is held by surface forces of sufficient magnitude as to render the water molecules more or less unavailable to the plant, and when the soil is very dry the whole of the water present in the soil may be of this unavailable character. The amount of this unavailable water which is still present in the soil when a plant permanently wilts is a quantity which varies, not only with the kind of plant and the type of soil, but also with the external conditions at the time of the experiments.

A coarse sandy soil such as that of a dune may only retain 1.0 per cent. of its weight of water with sufficient force not to be of use to the plant under normal conditions, whereas a sandy loam will, in similar circumstances, probably retain about 9 per cent., and a clayey loam some 16 per cent. If a plant be using water rapidly, there will be more water left behind when it permanently wilts than if it were transpiring water slowly. Actually during the severe and prolonged drought of 1935 the water content of the soil in my own garden, on a sandy loam, was reduced to 7.5 per cent. around the roots of Forsythia and other shrubs when they began to wilt permanently—an amount probably below that of the normally unavailable limit. Wilting is the outward sign of the internal lack of balance between two processes, namely, the absorption *rate* of water and the *rate* of water loss. Such a condition may obtain when there is ample water in the soil, as, for instance, when the soil is very cold or the air very arid.

When plants are slowly transpiring it was found by BRIGGS and SHANTZ (U.S. Dept. Agric., Bureau of Plant Industry, Bull. No. 230, 1912) that the amount of water remaining in the soil when permanent wilting occurs is approximately the same for any one soil type in a wide range of species. On the other hand, they found great differences between different kinds of soil. Quite recently B. N. and B. R. SINGH have obtained similar results for distinct soils and species in India (Proc. Indian Acad. Sci., iv, 376-402, 1936). Such experiments, whilst stressing the great importance of soil texture, seem to suggest that all plants are equal in their capacity to obtain water from a given soil type. This conclusion is, however, not warranted by the facts, for with high rates of transpiration, as CALDWELL showed (Physiological Researches, i, 1, 1912), the resistance of different species is quite appreciable. Ultimately it may well be true that the physical forces due mainly to soil texture bring about permanent wilting in most, if not all, species at slow rates of water loss, before appreciable differences due to their diversity of organization, both structural and physical, become manifest. But from the point of view of the plant's physiology even the condition of temporary wilting brings with it a check to activity in several important respects, and the readiness with which this temporary wilting ensues may be very different in different species. There is in fact little doubt that the different extents of the root system, the different rooting depths, differing resistance to desiccation of the root hairs, and other distinctions between species in their biological equipment, operate differentially to distinguish between them in their resistance to drought. It is an undoubted fact, to which many horticulturists can bear witness, that during the recent years of severe drought species growing together in the same type of soil actually wilted at very different periods and to very different degrees.

Observations on prairie vegetation in America during the severe drought of 1934, when the soil to a depth of 4 feet was devoid of available water, demonstrated the great importance of rooting depth for drought survival (*cf.* Ecology, 16, 612, 1935). Such facts emphasize the importance of deep-rooted varieties, of deep trenching, and other means of increasing root penetration as practical means of avoiding the ill effects of desiccating conditions.

The practical influence of soil texture can perhaps best be realized if we compare a sandy loam and a clay soil, each containing a fifth of its weight of moisture. It would only require a suction equivalent to about 5 cm. of mercury to obtain water from the loam, but the plant would need to exert a suction thirteen times greater to obtain water from the clay.

Let us then consider in greater detail how the soil retains its water. When one dips a lump of rock into water and withdraws it, the fact that the surface is wet shows that the water molecules are attracted by the surface of the solid more than they are by the other water molecules. It is this difference in the relative strengths of adhesion of the liquid to the solid and of the liquid to itself that is responsible

for the rise of water in a fine tube. If we crush the lump of rock without any wastage, its volume will clearly remain the same, but owing to the multitudinous fractures the surfaces that can be wetted will have an enormously increased area. Whereas the total surface of the unbroken lump could have been measured in inches, when reduced to a fine powder the surfaces of all the minute particles put together will occupy an area that might be a large fraction of an acre.

Some idea of the magnitude of the force with which the water closest to the solid particles is held is afforded by the slight rise in temperature that occurs when a dry finely powdered soil is wetted. This "heat of wetting" is a consequence of the fact that the force of attraction is so great that there is an actual compression of the water in intimate proximity to the solid surfaces. This compressed layer is spoken of as the adsorbed water, and some of this water is held by forces of the order of a thousand atmospheres. Such water is unavailable to the plant. But the force of attraction, though so powerful, diminishes very rapidly as the distance from the surface of the solid increases, so that the water in the outer part of a thick water film may only be held with an attraction of the order of one atmosphere or less. It is this water that is sometimes called "capillary water." The determinations of W. S. ROGERS at East Malling have shown that a sandy loam at 12 per cent. moisture content retains water with about twice the force that it exerts at 15 per cent. water content, whilst with a water content of 20 per cent. the resistance offered to absorption by the plant is only about an eighth of the resistance to be overcome at 12 per cent. of water (Jour. Agric. Sci., 25, 326, 1935).

It must be emphasized that there is no real line of demarcation between the strongly adsorbed water, the "capillary water," or the water, termed "gravitational water," which drains away under the impetus of gravity and is, of course, the portion most readily available to the plant. The soil water is contained in and moves through the pore spaces of the soil, which spaces together constitute a system permeating the entire soil mass. This pore space system is partly occupied by water, partly by gases, an increase of the one being accompanied by a decrease of the other. If for the sake of simplification we imagine the solid particles of the soil to be all spherical, it is easy to show mathematically that the total volume of the spaces between the spheres remains the same whether the spherical particles be small or large. If we adopt the closest method of packing, the total pore space will be very nearly 26 per cent., or if we adopt the most open method of packing, 47 per cent. In other words, the space available for water and air in a soil of spherical particles would be independent of their size. Actual determinations of pore space in garden soils show that, except when large amounts of organic material are present, the pore space is between the two limits just mentioned. So, though soil particles are not spherical, the space available for air and water is probably much the same even in quite different types

of soil, though the finer-textured ones, having such a much greater internal surface, tend to retain more water and thus a lower proportion of air. The pore system is not a simple complex of fine capillary tubes, but may be thought of as a multitude of minute chambers, usually with more or less convex sides, connected with one another by fine capillary necks.

When water moves through the soil to a root hair the moving film of liquid is sometimes extended, sometimes diminished, in the one case retarded, in the other assisted by the forces of surface tension. At low water contents the moisture is distributed as detached or connected rings around the points of contact of the soil particles; as the water content increases the films become continuous, and ultimately the pore space may become entirely filled. The force requisite to move the water films varies with their mode of distribution, and it is due to this fact that, for a given suction force, the availability of water is not necessarily constant and will differ, at the same water content, according as to whether the soil is becoming wetter or drier. Availability will depend on the interaction of the forces of attraction exerted by the soil on the one hand, and the potentiality of the plant on the other, to exert an even greater force of absorption. The water-retaining capacity of the soil is dependent upon the total surface which the particles collectively present; this surface is extremely large and may, as in clay soils of which the particles are very fine, be from $2\frac{1}{2}$ to 4 acres to the cubic foot, but clearly in such soils the proportion which is unavailable will necessarily be greater than in those soils, such as loams and sands, in which the surface is much smaller (1.5 to 0.25 acre to the cubic foot). But the effective retaining capacity of soil is, as we know, enormously increased by the presence of organic material. Thus we find that in a dune system with one and the same rainfall the youngest dunes, on the sea-face, exhibit all the characteristics of a desert, whilst the oldest dunes, on the landward side, in which with the passage of time organic material has been added to the sandy matrix by the vegetation, retain a sufficient proportion of the water falling upon them to support a vegetation comparable to that of the mainland itself. But high retentive capacity may with high rainfall bring in its train so great a diminution of the available pore space that, whilst the plants are adequately supplied with water, they suffer from a meagre supply of oxygen for the root system. Moreover, high organic content usually brings in its train a high acidity which has a toxic action on the root. And so we encounter at the outset one of those compromises which the plant has to make between the advantages of increasing water supply and the disadvantages of diminished aeration. These disadvantages are that not only is root growth itself diminished by poor aeration, but deficient oxygen supply also materially retards absorption itself. The observations of K. SINGH (*Ann. Bot.*, **36**, 353, 1922) that watering pot plants from below was more beneficial than watering from above may perhaps be attributed to absence of water-logging.

From the practical standpoint we have to appreciate this compromise between water content and aeration and also recognize that the manner in which organic material is distributed in the soil may be of paramount importance as determining the relation between the region of maximum water supply and maximum root development. Surface dressings of organic material or accumulations of organic material within the surface may be so retentive of water that when the rainfall is slight the whole of the precipitation may be retained in the upper layer; hence the sub-surface and deeper layers will be, as it were, starved of their water supply. It is thus that a grass covering may inhibit the root development of fruit trees, or a surface mulch of manure may impoverish the growth of deep-rooted perennials in the herbaceous border.

Passage into the plant may be hindered in various ways, and of these the one of most practical significance is through a drop in temperature. Experiments recently carried out by CLEMENTS and MARTIN (*Plant Phys.*, ix, 619-630, 1934), using Sunflower plants, show that the rate of water absorption falls with great rapidity when the soil temperature is below 55° F. (12.7° C.), and at 38° F. (3.3° C.) absorption is only about half that at 55° F. DUNCAN and COOK, working with the Sugar Cane, also found a decreasing absorption with falling temperature for this species, but between 82.4° F. and 50° F. (28° C. and 10° C.). In other words, it would appear that the temperature level at which absorption changes most rapidly is characteristic of the type of plant, and with tropical plants the critical temperature is, as we might expect, higher than with those native to temperate or northern climes.

The experiments of DORING (*Zeitschrift f. Bot.*, 28, 305, 1935) upon detached shoots of a number of plants would seem to indicate a wide range of sensitivity to temperature changes in regard to absorption, some plants, such as the Marsh Cinquefoil, being apparently almost unaffected by low temperature in this respect.

Air temperatures in day-time are often in excess of soil temperatures and, especially during the winter months when the soil is cold, a very slow rate of absorption may obtain when the sun is shining and the external conditions tend towards a high rate of evaporation from the leaves; hence the scorching of evergreen leaves on sunny days in winter. So, too, in greenhouses we may find our plants wilting despite the soil being still quite moist, merely because the porous pots in which they are grown are exposed to a draught that, by accelerating evaporation, causes rapid cooling. Hence the roots on the inside of the pot are at too low a temperature to permit of the rapid intake of water. Again, absorption is retarded by the presence of dilute acids, because they reduce the permeability of the protoplast. We may note, too, that SEN (*Proc. Roy. Soc., B*, 103, 272-288, 1928) found that the permeability of the plasma membrane to ions increases with increasing temperature up to about 35° or 40° C., and then permeability decreases with any further rise up to the temperature at which the cell is killed.

Hence, watering with tepid water will increase the rate of intake, whilst watering with acid peat water may actually do more harm by its toxic effect than good by relief from the physical drought the water was intended to assuage.

Though MONTFORT's experiments (*Jahrb. f. Wiss. Bot.*, **60**, 184-256, 1921) may perhaps indicate that peat water has little direct effect on absorption as such, there is abundant experimental proof of its toxic effects on the roots of many plants, and the intake of water molecules appears to demand, like the intake of salts, a healthy metabolism. Indeed experiments recently carried out by L. HENDERSON (*Plant Physiology*, **9**, 233, 1934) seem to establish a definite correlation between the absorption of rain water and the rate of respiration of the roots as measured by the evolution of CO_2 . The fundamental necessity of adequate soil aeration is thus becoming more and more emphasized.

Let us, then, in the light of our brief survey try to visualize the control that we can exercise upon the water available for the plant. First we can modify the water-retaining power of the soil by increasing its internal surface through the addition of organic material or fine-textured mineral particles such as clay, or, on the other hand, we can decrease the water capacity by introducing sand and thus diminishing the internal surface. If precipitation be deficient we can adopt the most common form of control, namely, watering. But in so doing we add the water very locally and displace more or less completely the air in the pore spaces of the surface soil. Hence in large measure we may deprive the contained roots of the oxygen needed for their respiration. The merit of watering around the roots of a plant rather than the soil actually exploited is largely due to this fact.

For similar reasons successive light waterings are usually more beneficial than a few heavy ones. Moreover, heavy waterings, by furnishing easily displaced liquid, accelerate the leaching out of nutrient salts. If the temperature of the water employed is appreciably below that of the soil, the chilling effect will be prejudicial to water intake and may quite possibly more than counterbalance the benefit derived from the higher water content. Thus tepid water is more beneficial than cold, but if the temperature of the water be raised above about 50°F. , not only is the accelerating effect upon absorption slight but it may easily be more than discounted by the stimulus of the higher temperature to carbon dioxide production by the soil organisms, which may then produce this gas in sufficient amount to be inimical to absorption by the root hairs of water and dissolved salts.

The beneficial effects which accrue from the watering of pot plants, especially with respect to certain species, by capillarity from below upwards, instead of by precipitation from above, are, as already noted, probably an outcome of the different conditions of soil aeration. Localized water-logging of the soil around the rootlets is by this method usually avoided. Furthermore, the soil atmosphere, heavy with an increasing proportion of carbon dioxide, is, under normal conditions, displaced by mere diffusion with some difficulty unless

appreciable changes of temperature bring about expansion and contraction of the gases and thus facilitate mixing with the atmospheric air. In heated houses, where the temperature is much more constant as between day and night than in the open, such changes of volume are minimized. But when the soil atmosphere is displaced from below upwards by the capillary rise of water, the heavy mixture of gases tends to be driven out and to be replaced, as the soil becomes drier, by atmospheric air with its slightly higher content of oxygen and appreciably lower content of carbon dioxide.

In nature the risk of water-logging is in some plants minimized by the protection afforded by the foliage, which, acting as an umbrella, results in much of the rain water being shed at the periphery of the leafy canopy. KERNER was one of the first to call attention to the fact that the leaf arrangement of plants with a spreading root system commonly tended to direct the precipitation towards the root tip, whilst in others, notably plants such as Arums with restricted root spread, or plants like those of the Carrot tribe which possess tap-roots, the leaf arrangement combined with the channelled leaf stalks directs the rain water inwards instead of outwards. Such "auto-irrigation" is probably, however, far less exact than KERNER supposed, since the extent of root system is now known to be much greater than was formerly recognized. Thus on clay soils at East Malling the root tips of Lane's Prince Albert Apple trees, instead of being situated beneath the edge of the canopy, actually extend more than half as far again from the trunk.

We are only too familiar in our social organization with the limitations on availability of supply due to inadequacies of transport and distribution. The plant may suffer in a similar way. The most familiar instance is the so-called physiological drought experienced by salt marsh plants, which, when covered by the tide, are almost in the position of the Ancient Mariner—"Water, water, everywhere, and not a drop to drink." For their successful growth they are in fact dependent on dilution of the saline soil water by rainfall during the inter-tidal periods. The high concentration of salts in the sea water offers so great a resistance to the intake of water that the amount the plants are able to absorb from undiluted sea water is negligible. We do not normally have salt marsh vegetation in our gardens, but precisely similar consequences accrue from excessive application of artificial manures, which may increase the concentration of the soil solution to such an extent as to retard profoundly, if not actually to inhibit, the absorption of water by the root. Normally, however, the osmotic pressure of the soil solution is about 0.2 to 1 atmosphere.

When we see a plant wilting on a hot summer's day we are witnesses of a comparable condition, due, however, to other causes. Except in severe drought it is usually not that there is insufficient water present in the soil to maintain the plant in a turgid condition, but that the rate of intake of this water cannot keep pace with the water loss from the leaf surface. The time factor is the essence of the

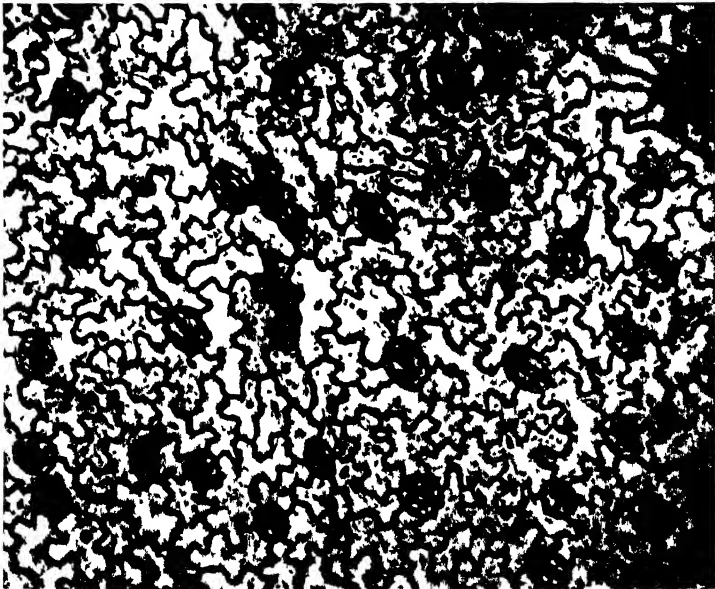


FIG 112—LOWER EPIDERMIS OF MARSH MARIGOLD
(*CALTHA PALUSTRIS*) $\times 95$
Note large stomata about 14 728 to the sq inch



FIG 113—LOWER EPIDERMIS OF SILFNE MARITIMA $\times 90$
Note stomata 49 000 to the sq inch



FIG. 114.—SECTION THROUGH THE EXTRA-FLORAL NECTARY OF *POLYGONUM CUSPIDATUM*, SHOWING THE SECRETORY HAIRS.

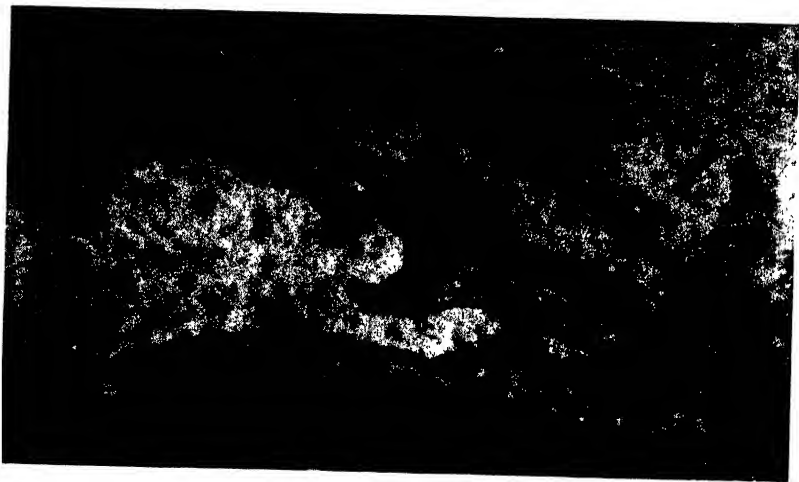


FIG. 115.—SECTION THROUGH FLOWER OF *RANUNCULUS PARVIFLORUS*, SHOWING NECTARY TO WHICH PASSES A VASCULAR BUNDLE, AND WHICH ACTS AS A FLORAL HYDATHODE.

problem. The water income of the plant is inadequate to meet its water expenditure, and so we find seedlings planted out in the open drying up and perishing, whereas, when shaded with an inverted flower-pot, they survive, because we have thereby cut down the water expenditure sufficiently to avoid a serious deficit between expenditure and income. Most plants, it is true, lose more water during a hot day than is actually taken in during the same period : hence the shrinkages which have been observed during the day-time both in leaves and stems. But, provided the deficit be only small, the greatly reduced water loss at night will allow for readjustment, and the turgidity regained will often permit of sufficient water reserve, so that cell activity is not seriously impeded by any slight day-time excess of expenditure over income.

If we estimate the total surface presented by the foliage of a plant and determine also the average rate of water loss from that surface, we can arrive at a sufficiently close approximation to the rate of expenditure. If now we determine the extent of the root system, we can estimate, albeit roughly, the total volume of soil with which that root is in contact, and from this, and from data as to the water content of the soil, we can judge how often the water must be replaced in order to keep the plant adequately supplied. Such estimates will, I think, readily convince us that the soil immediately around the roots is quite often inadequate to supply the plant if that alone were the source. It is at once evident that there must be continual renewal, and therefore transport of water through the soil itself. To effect such transport the resistance to flow through the soil must be overcome, and this resistance must, therefore, clearly play a not inconsiderable part in determining the relation between supply and consumption.

The resistance to flow which the soil offers varies with the soil type and is very much greater in fine-grained soils such as clay than in coarser-textured soils such as sands and loams. Horizontal capillary movement in sand with a high water content is, for instance, rather more than twice as fast as in a clay, and the drier the soil the smaller the proportion of relatively mobile water, so that the differences between the soil types in this respect become accentuated.

This dynamic aspect has been emphasized in various papers by Dr. B. E. LIVINGSTON and his collaborators. He and W. L. NOREM have recently shown that the state of wilting was attained by plants growing in sixteen different artificial soil mixtures when the water-supplying power of the soil was approximately the same (*Soil Science*, 43, 177-204, 1937).

The capillary rise of water in the soil is due, as I have said, to the attraction for the water molecules of the surface of the solid matrix of the soil being greater than the attraction of water molecules for one another. Thus water rises in a fine capillary tube until the pull of gravity exactly balances the driving force provided by the differences of molecular attraction, but the rise of water from this cause is not very great, and even in the coarsest sands the rate of

transport by capillarity is not usually sufficiently rapid to be an important source of water supply. But under other motive forces capillary water may move rapidly, and such a motive force is provided by the osmotic suction of the root hairs. When two solutions are separated by a semi-permeable membrane, such as the living protoplasm furnishes, the osmotic suction is a function of the molecular concentration of the solutions and of the ionic concentration of such molecules as have become dissociated. If the concentration of the cell sap of the root hairs as thus measured be greater than that of the soil solution, water will flow into the root until the cell contents have become so distended that any further intake of water is prevented by the restraining force of the cell walls. The difference between the distending force exerted by the attraction for water molecules of the dissolved substances in the cell sap and the restraining force of the wall is the suction force whereby water is taken in.

The capacity of plants to regulate their osmotic pressure is remarkable, and numerous investigations have shown that the suction force varies inversely with the humidity of the environment. At the one extreme we have desert plants some of which are potentially capable of developing osmotic suctions of over 100 atmospheres. In other words, to squeeze water out of such a cell we should require a pressure equivalent to about 1,500 lb. to the square inch. At the other extreme are aquatics with suction forces of but a fraction of an atmosphere.

One of the commonest forms of food reserve in plants is starch, which, being an insoluble substance, exerts no osmotic suction, but the molecule of starch is a long chain of units variously estimated as between 400 and 1500 in number, each of which on hydrolysis yields a single sugar molecule, and thus when the starch is converted to sugar we have a high osmotic pressure replacing no osmotic pressure at all—a process that takes place rapidly by means of enzyme action and which, being reversible, enables the plant either to increase or decrease its osmotic suction with comparative rapidity. This is not the only way in which such adjustment is brought about, but such changes combined with the direct effects of dilution enable one to understand how it is that the same plant may at different times present osmotic suctions ranging from 10 to 30 atmospheres, and yet the plant does not in fact explode by the violent intake of water when a drought is succeeded by a heavy fall of rain.

By virtue then of its capacity to develop suctions in excess of the retaining power of the soil, the plant is able to absorb water into the root system. Actually F. BRISGER (*Jahrb. Wiss. Bot.*, **69**, 295–330, 1925) has obtained experimental proof that absorption by intact plants is directly proportional to the difference between the suction force and the resistance to be overcome. The high degree of accommodation of which the plant is capable is well shown by experiments of URSPRUNG and BLUM (*Ber. d. Deut. Bot. Ges.*, **39**, 139, 1921), in which one part of a plant root system was in a medium of low osmotic

pressure and another part in a medium of a higher osmotic pressure. In each part the suction force of the root hairs was adjusted to that of the medium around.

But despite the remarkable capacity which the plant exhibits towards adjustment under conditions of high humidity of the air and high water content of the soil, the plant may temporarily experience an excess of turgor. The majority of plants possess safety-valves in the form of so-called water-pores or hydathodes from which liquid water is exuded when the turgor pressure in the plant becomes excessive. They develop very early in the maturation of the foliage, and can thus function when the leaf as a whole is still immature and its cells not sufficiently differentiated to withstand a high internal pressure. Under suitable conditions the exuded water can be seen as drops on the leaf tip or on the leaf teeth, where such water-secreting structures are usually situated. Below the water-pores and between them and the water-conducting tissue there is a group of cells separated by narrow intercellular spaces through which water can be forced under the requisite pressure (figs. 116, 117). They are readily seen, for example, at the margin of the leaves of the Marsh Marigold (*Caltha palustris*). Less commonly plants possess safety devices that are dependent on osmotic action. Such are seen on the young fronds of the common Bracken Fern, and even more conspicuously on the leaves of the Guelder Rose (*Viburnum Opulus*) and various species of *Polygonum* (e.g. *P. sachalinense* (fig. 114).

It may be remarked that the nectaries (fig. 115) of most flowers are probably specializations of such osmotic hydathodes which, though in origin connected with the relief of excessive turgor-pressures in the delicate organs of the young flower bud, have become modified in relation to insect visitation. It is interesting to note in this connexion that, owing to the presence of their nectaries, dehiscence of the stamens of some flowers can be brought about even in a saturated atmosphere. This is the case, for instance, in the flowers of *Stellaria Holostea* and Helleborus, and it is perhaps not mere coincidence that many such flowers are natives of woodland or other habitats where a high humidity not infrequently obtains.

Under conditions of saturation the amount of water that the plant takes up will not be influenced by the extent of its root surface in contact with the soil, since the limit to the rate of flow to the leaves will be imposed by the internal structure of the plant. K. HOHN (Zeitschrift Bot., 27, 529-564) has shown that when the root is surrounded by liquid the presence of root hairs does not increase the rate of absorption. But when a soil is not very moist, the surface of contact of the root system has great significance, and it is under these conditions that the increased surface due to the extent of the root system and the presence of root hairs becomes important. Experiments have also shown that whilst in damp or moist soil the younger parts of the root which bear root hairs are the chief regions of absorption, the older parts have become relatively more important in this respect

as the soil becomes progressively drier. The oldest parts of the root system are usually covered with cork, and since this is partially, though not completely, impermeable, such regions can be of little value for absorption; but it should be emphasized that by no means all species exhibit a restriction of absorption to the root tips, and in some of our garden plants, such as *Chrysanthemum uliginosum*, the root hairs in the older parts of the root system retain their functional activity for a period of years, whilst species of *Tradescantia* develop secondary persistent root hairs from the hypodermis after those of the piliferous layer have perished (cf. M. E. PINKERTON: Bot. Gaz., 98, 147, 1936).

The extent of the root system has two functional aspects, namely, that of anchoring the plant in the soil and that of absorption. In relation to mechanical support an extensive root system becomes more and more important as the soil becomes wetter, whilst the reverse relation holds with respect to the intake of water, though not perhaps with respect to the absorption of nutrient salts, although, if the soil be water-logged, the low rate of root respiration may render a large absorbing surface desirable.

It cannot be too strongly emphasized that the success of a plant, whether in the garden or in the wild state, will always depend upon its capacity to meet, not the average, but the extreme conditions to which it is subjected. An extensive root system becomes progressively more important as the water content of the soil diminishes. The natural reaction of the plant to very wet soils is a reduction in root development, perhaps mainly owing to deficient aeration. The greatest root extension is encountered under conditions of good aeration and moderate water content. The root systems of individuals of the same species growing in areas of differing rainfall will in general be found to be less extensive under the higher precipitation. Similarly a dry year, or still more a period of dry years, may stimulate considerable extension of the root systems of perennial plants. A feature of considerable practical importance is that the extent of the root system is often profoundly affected by the conditions to which we subject the plant in its early growth. The permanently stunted character of shrubs and trees which are allowed to become pot-bound before being planted out is only too familiar. Why subsequent growth does not make good the deficiency is a question which calls for critical investigation.

That the extent of a root system is as much a character of the individual as the height of its shoot has been sufficiently demonstrated for Apple varieties by Dr. HATTON at East Mallory, and this is probably true also of plants in general. Naturally, since work must be done in displacing the soil as the root grows, the penetrability of a soil has a marked influence on the rate of growth of the root and its ultimate extent. A Violet growing in a heavy clay soil may have a root system that does not occupy a volume of soil of more than one-eighth of a cubic foot, whereas the same variety grown in a sandy soil may develop a root system occupying more than eight times that volume. In the



FIG. 116 —WATER SECRETION FROM HYDATHODES OF LEAF OF *POTERIUM* *OBTUSATUM*.

[To face p. 440



FIG 117 — WATER SECRETION FROM HYDATHODS ON LEAF TEETH OF *ALCHEMILLA*



FIG 118 —*LILIUM LONGIFLORUM* IN HYDE PARK, 1937



FIG 119 —THE WHITE-BARKED PINE (*PINUS BUNGEANA*) GROWING WILD
IN N CHINA

[To face p 441

clay high water content and high resistance to penetration combine to check root growth, whereas the reverse is true of sand. Not the least of the merits of leaf mould in horticulture is that it provides a high retentive capacity for moisture with ease of penetration, qualities also shared by peaty soils, but the organic acids of the latter act, as we have noted, adversely. It is perhaps not too much to say that a more extensive knowledge of the response of the underground parts of cultivated plants to their conditions of growth would materially assist in the successful cultivation of difficult subjects. Manifestly their appropriate spacing will depend on their individual characteristics and response in respect to root growth.

When we cultivate a soil we loosen the soil texture, and so by increasing the pore space we have diminished the resistance which the soil offers to penetration by the root, so that with the same expenditure of energy a more extensive root system is developed. Moreover, in a dense soil the limited pore space itself restricts the amount of water which the soil can retain and offers great resistance to its flow.

Experiments have shown that with increase of pore space there is an initial increase of water-holding capacity and a materially diminished resistance to rate of flow through the soil. Hence cultivation renders more water available and also facilitates good aeration. These effects are well illustrated by the results obtained by GUPTA (*Jour. Ecology*, xxi, 452-474, 1933), using a garden loam in a compacted state, in a loose state, and in an intermediate condition. He found (fig. 120) that differences with respect to penetrability, water-content and rate of flow vary in a manner similar to that of the total pore space. Hence, cultivation tends to improve the soil in all these four respects.

Not only the actual extent but the manner of distribution will affect the water supply, and this depends not only on the nature of the plant but on a variety of external factors. The directional response of root growth to unequal distribution of appropriate stimuli may play a significant part in determining the amount of available water. Of these responses the most generally important is that responsible for the growth of the root in the direction of an increasing moisture gradient. Critical experiments, notably those of H. B. HOOKER (*Annals Bot.*, 29, 265, 1915), have shown not only that roots do grow from a region of lower humidity to one of higher moisture content, but that in some species at least such response only occurs in conditions of high humidity. Moreover, in the White Lupin—and this may be true of other species also—it would appear that for response to take place the difference of humidity between any two points in the soil must be neither too great nor too small. In other words, the humidity gradient to which the roots respond has a definite range. Recent experiments carried out with a great variety of species, which claim to show that such hydrotropism is of rare occurrence in roots, may quite probably be of no significance in view of the very steep humidity gradient employed.

The fact that roots will grow in the direction of higher oxygen

concentration may involve growth in a reverse direction to that of an increasing moisture content. By regulating both moisture and the aeration of the soil the direction of the root system can be, to some extent, controlled. In this connexion we may emphasize the influence which the application of artificial manures may have upon the direction of root growth. Two of the most frequently used of these, namely,

EFFECT OF SOIL DENSITY

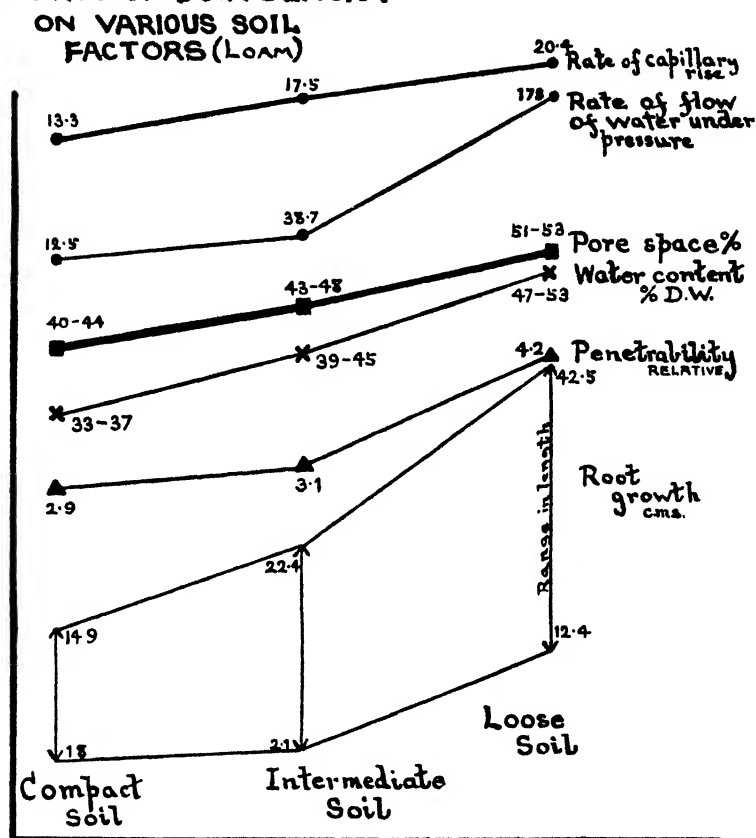


FIG. 120.—DIAGRAM ILLUSTRATING EFFECT OF CULTIVATION ON SOIL.

potassium sulphate and ammonium sulphate, cause roots to grow in the direction of increasing concentration, so that surface applications of these may lead to surface rooting. The response to potassium nitrate varies with the concentration, whilst common salt tends to induce growth in the direction of decreasing concentration.

All such responses may operate towards an increased or a decreased exploitation of the sources of supply, and clearly constitute so many tools in the hands of the expert cultivator that assist him to control the underground system of the plant just as he trains and guides the overground shoot to serve his ends.

THE WHITE-BARKED PINE (*PINUS BUNGEANA* ZUCCARINI)
IN NORTH CHINA.

By ARTHUR DE CARLE SOWERBY.

IN the July 1934 number (vol. 59, p. 249) of the JOURNAL of the Royal Horticultural Society appears an interesting article by W. DALLIMORE entitled "The Lace-Bark Pine (*Pinus Bungeana* Zuccarini)."

Quoting Mr. M. E. WEATHERALL in a letter to the Royal Botanic Gardens, Kew, he says, "*Pinus Bungeana* occurs in N. China, but I have never seen one growing naturally. It is said that there is a forest of these trees in Shansi, but I have never met anyone who has seen them. Curiously enough, I have never come across any reference to these remarkable trees by any foreign writer before WILLIAM FORTUNE, a trained man."

In connexion with this, attention may be called to a number of published passages concerning the occurrence in a wild state of this tree in the province of Shansi and elsewhere in North China.

Sport and Science on the Sino-Mongolian Frontier, by ARTHUR DE C. SOWERBY (Melrose), 1918, p. 219, contains the following:

"In Shansi one also comes across the peculiar White-barked Pine (*Pinus Bungeana*). It is characterized by having a three-needled leaf, and by its smooth silvery-white bark. This tree is very rare." Unfortunately this passage does not make it clear that I was referring to trees growing in a natural state in the wild mountainous areas, but this was intended.

Mr. WOON YOUNG CHUN, in his Chinese Economic Trees, published in 1922, p. 13, says of the white-barked pine: "This pine is planted in temple grounds and courtyards, and is rarely seen in a wild state. There are indications that this tree once formed extensive forests."

In The China Journal of Science and Arts (now The China Journal), vol. iii, no. 9, September 1925, p. 504, in an article entitled "A Preliminary Report on Botanical Investigations in South and Central Shansi," Dr. H. SMITH, a Swedish botanist, at present carrying out botanical exploration work on the Chinese-Tibetan border on behalf of the Upsala University, in referring to the fact that in Shansi the temples have less influence in protecting forests than elsewhere in China, says:

"... Met with at temples are the maidenhair tree (*Ginkgo*), *Cupressus*, *Catalpa*, *Diospyros*, *Populus*, *Salix*, *Broussonetia*, *Aleurites*, *Sophora*, *Ailanthus*, *Juniperus*, *Pinus sinensis*, *Pinus Bungeana* and *Picea*. In one case, however, the temple preservation has proved to be extraordinarily valuable. One of the temples at the western foot of Mienshan, at Chieh-Hsiu, Central Shansi, connected with the ancient

history of Shansi, has preserved a big forest of the very rare, exclusively Chinese tree, the white-stemmed pine, *Pinus Bungeana*." Reproductions of photographs by Dr. SMITH of some of these white-barked pines in the forest-remnant mentioned are also given. This may be the forest referred to in Mr. WEATHERALL's letter as quoted by Mr. DALLIMORE.

In the same publication, vol. iv, no. 2, February 1926, p. 78, in an article entitled "Notes on the Conifers of North China," referring to *Pinus Bungeana* Zucc. Mr. J. HERS says :

"Wilson came across this species in West Hupeh ; it also grows wild in Western Honan, South and Central Shansi, and in East Shensi. I saw it in rather large numbers in the district Lushih (Honan), always at about 1,500 metres altitude, clinging to the rocks ; and also south-west of Taiyuanfu at the same altitude.

"As a cultivated tree it is found northward as far as Peking, and eastward in several places in Shantung. The word cultivated is not quite correct, for the Chinese gave up its cultivation long ago. They prefer to go into the mountains to uproot young trees, to put them in nurseries, and to sell them in clods five or six years later, always at a good price."

Again in the same journal, vol. iv, no. 3, March 1926, p. 131, Professor W. C. LOWDERMILK, then of Nanking University, in an article entitled "Forest Destruction and Slope Denudation in the Province of Shansi" says :

"The white-bark pine (*Pinus Bungeana*) of Mien Shan, protected by the temple of Sun Lin Miao, is also a noteworthy remnant of forest."

In *The Familiar Trees of Hopei* * by H. F. CHOW, published by the Peking Natural History Society in 1934, under *Pinus Bungeana* Zuccarini occurs the passage :

"DISTRIBUTION—North and West China ; often found in Hopei, Shansi, Shensi, Kentsu, Hupeh and Szechuan provinces ; it is rarely seen in a wild state in Hopei, only several trees on the mountain peak of Shen-Hsien-Tung of the Eastern-Tombs region certainly are growing wild."

Then there is the late Dr. E. H. WILSON's record in *Plantae Wilsonianae*, vol. ii, p. 14, quoted in Mr. DALLIMORE's article, of this tree's occurrence in a wild state in Western Hupeh.

Finally in *The China Journal*, vol. xviii, no. 6, June 1933, p. 374, under "Scientific Notes and Reviews," appears a paragraph entitled "The White-Barked Pine," in which I make the following statement :

"For a very long time the original home of the Chinese white-barked pine (*Pinus Bungeana* Zuccarini), one of this country's most beautiful trees, was not known, as it had only been found in and round temples, where it had been planted by man. Some years ago we were criticised in a review of our book, *Through Shen-Kan*, written jointly with Mr. ROBERT S. CLARK, leader of the Clark Expedition into Shensi and Kansu in 1908-9, for not having given any information as to the

* Hopei is the new name for Chihli Province.

occurrence in a wild state of this tree. The review intimated that up to that time it had not been discovered anywhere dis-associated with human dwellings. Since then (1910) we have kept a look-out for the white-barked pine and in the winter of 1916-17 discovered it growing in the mountains of Western Shansi, west of Fen-chou Fu, too far away from any human habitations to allow of its having been introduced by human agency, and, in view of this discovery, we feel safe in naming this province of Shansi as the original home of this tree."

From all of these passages it may be gathered that this very striking tree grows in a natural state in all the wilder mountainous parts of Shansi Province, in neighbouring parts of Shensi and Chihli (now Hopei) (fig. 119), and as far south as the province of Hupeh. I, personally, have seen it growing in several such areas, notably throughout the high mountains of Western Shansi, to the west and south-west of Tai-yuan Fu. I have also seen it in the mountains immediately east of that city.

That it does not occur more plentifully is probably due to the fact that it is in such great demand as an ornamental tree, and that vendors prefer going into the mountains to dig up saplings to raising it from seedlings, as described by Mr. HERS.

I am satisfied that the part of China occupied by Shansi, West and North Chihli, Shensi, Honan and neighbouring parts of Hupeh and Szechwan may be considered as the true home of *P. Bungeana*, the province of Shansi, where it is most plentiful, probably being its place of origin.

Although I have travelled extensively in most of the wilder parts of China, I have never seen this tree growing in a state of nature in any area other than in the general region here designated, though I have frequently seen it in temple grounds.

As a matter of interest, the tree shown in the photograph facing p. 258, vol. 59, of the Royal Horticultural Society's JOURNAL would appear to be the famous white-barked pine named the "Chiu Lung Sung" or "Nine Dragon Pine" by the emperor Ch'ien Lung some three hundred or so years ago. It is in the temple known as the Chieh T'ai Ssu at Men-tou Kou in the mountains to the west of Peking, not in Peking itself. The name referred to the nine great branches into which its trunk is divided.

A GARDEN IN THE ANTIPODES.

RAROA AND ITS ENVIRONS, RAKIURA, NEW ZEALAND.

By BRENDAN P. MANSFIELD, N.D.H. (N.Z.), F.Inst.P.A.

INVENTION, commercial enterprise and modern facilities have so condensed the world that few places remain secluded in their natural beauty, yet in the far south of New Zealand, separated from the mainland by Foveaux Strait, lies Rakiura—as Stewart Island is more correctly called—which may be truly described as an earthly paradise with a perceptible difference in luxuriance of growth: a softness, a richness, at once refreshing, where time, day and date are of no consequence and one may be alone, apart from modern civilization and its noise. To the naturalist and horticulturist few regions of its size can compare with it for interest and beauty.

It is here the garden of "Raroa" (Long Sun) is to be found, situated close to the quaint township of Oban in Halfmoon Bay. Measured on conventional lines it can lay no claim to distinction, yet by virtue of its location, the representative character of its collections (a range of plants from sub-antarctic to sub-tropical regions, all growing in association without protection) and the personality of its owner, the garden extends, in imagination, if not in reality, beyond the confines of its allotted area through the magnificent bush-clad hills which rise up on either side of Paterson Inlet (fig. 121). Mr. GEORGE M. TURNER has made this region his particular territory, sparing neither pains to demonstrate its horticultural potentialities nor efforts to preserve surrounding areas in their primeval state.

"Remarkable is too weak a word," wrote the late Dr. LEONARD COCKAYNE, in describing the plant population of New Zealand: it is certainly much too weak for this garden, which is best described as "different." The owner did not construct or design "Raroa"—Nature had already done so—he merely altered it, changed it somehow, erected a dwelling in which to live and encompassed it with some of those plants with which he was most familiar. An average rainfall of 63–64 inches, and absence of excessive cold, where shelter from persistent winds is afforded, favour rapid growth. The rate at which many exotics move upwards is startling, indeed interesting figures could be presented by systematic measurement. For example, *Eucalyptus ficifolia* has grown over 2 feet in a season, *Picea Smithiana* has presented a rod-like growth, and *Sequoia gigantea* appears determined to create records.

By accident, rather than design, a collection has been gathered together which cannot fail to arrest the attention of any horticulturist. To quote Mrs. C. W. EARLE: "On going into a garden one knows by

instinct, as a hound scents the fox, if it is going to be interesting or not." This garden does not conform to accepted rules, but it is one in which natural forest features have been retained and a variety of plants introduced; hardy, half-hardy and tender ornamental trees and shrubs, herbaceous, alpine and seasonal bedding plants are arranged in a manner so artistic that the unusual is not conspicuous but rather merges into an attractively interesting association.

With a background of Pines and Eucalyptus, shelter is provided for large bushes of Fuchsias, *Boronia megastigma*, *Medicago arborea*, *Daphne indica rubra*, *D. Mezereum*, *Dimorphotheca Ecklonis*, *Felicia angustifolia*, *Polygala oppositifolia latifolia*, *Luculia gratissima rosea*, *Prostanthera rotundifolia*, Grevilleas, etc., growing adjacent to *Poa foliosa*, *Anisotome antipoda*, *Bulbinella Rossii*, *Stilbocarpa Lyallii* (fig. 122), *S. polaris*, *Myosotidium nobile* (fig. 123) and *Myosotis albidia*. To clothe the verandah and embower the front entrance, *Polygonum baldschuanicum*, *Clematis montana rubens*, *C. Jackmanii*, ivy-leaved Geraniums, *Eccremocarpus scaber* and *Chorizema ilicifolium* are used, with one wall a dense mass of *Cotoneaster horizontalis*. As companion plants one does not usually associate *Agathis australis*, *Brachyglottis repanda purpurea*, *Metrosideros tomentosa* and *Rhopalostylis sapida* with *Dacrydium biforme*, *Metrosideros lucida*, *Fuchsia excorticata*, *Nothofagus fusca* and *Olearia angustifolia*.

Any catalogue of names must be monotonous; sufficient have been listed to demonstrate to the initiated a large number of other plants which it is only natural should be found in such company. The idea is to place on record what is already to be found in this far-off garden, rather than direct attention to species conspicuous by their absence, for time will correct this in this place of unbounded possibility.

The bird population is a source of sheer delight: it might well be regarded as one of the garden's chief charms. In particular the native bell-bird and tui, with their clear ringing notes, the fantail, tomtit, robin, parrakeet and waxeye, all in rich plumage, with unlimited provisions, expressing their joy in song; and those delightful birds the pigeon and kaka are there too: to them is attributed the complete defoliation of all Tree Lucerne, Laburnum and kindred plants. Life, song, colour, motion and industry are their rich contribution for the fruit, honey or foliage this garden provides in such abundance at all seasons. Feathered friends, knowing where they are welcome guests, are remarkably tame.

Few have unlimited wealth, but no resources could provide or create anything to compare with the scenic grandeur of the environs to Raroa. Stewart Island is irregularly triangular; the west, north-east and south-east sides being 39, 33 and 30 miles respectively. It is roughly 40 miles long, 26 miles wide, with an area of 665 square miles, covering 425,000 acres and with a coastline of over 1,100 miles. In this region, which is largely National Park, are to be found some five hundred species of indigenous plants, eighteen of which are not found elsewhere. Paterson Inlet, with a coastline of 135 miles, which pierces

into the centre of the island some 10 miles, is studded with a number of small islands, the largest of which is Ulva.

The island of Ulva, roughly $2\frac{1}{2}$ miles long by 1 mile wide, is an actual piece of the primeval world, unspoilt by the hand of man or depredations of imported animals: in every sense the perfect fairyland of which one might conjure up visions but never hope to see. Set aside as a scenic reserve for indigenous plant and bird life, with narrow forest tracks extending for miles, it presents most picturesque vistas at frequent intervals, in January resplendent with large splashes of crimson from the Southern Rata, *Metrosideros lucida*, seen to perfection with sudden shafts of sunlight breaking through the top growth. Leaving the anchorage of Golden Bay, or of Thule, by launch, it is a short trip across the inlet to a calm, placid bay in which to drop anchor and on reaching the shore secure the dinghy to a Mutton Bird Tree, *Senecio rotundifolius*. The first plants to be met with are *Linum monogynum* and *Gentiana saxosa*, but equally interesting is the Weka or Woodhen, *Ocydromus scotti*, a flightless bird seen here in great numbers forever scratching in loose shingle or through the forest floor.

Dominant genera found on this island in rich profusion include *Carpodetus*, *Dacrydium*, *Weinmannia*, *Podocarpus*, *Cordyline*, *Elaeocarpus*, *Pittosporum*, *Schefflera*, *Myrtus*, *Plagianthus*, *Olearia*, *Drimys*, *Aristotelia*, *Fuchsia*, *Metrosideros*, *Pseudopanax*, *Senecio*, *Leptospermum*, *Melicytus*, *Coprosma*, *Dracophyllum*, *Suttonia*, *Panax*, *Veronica*, *Hoheria*, *Dicksonia*, *Cyathea*, *Hemitelia*, *Alsophila*, *Gleichenia*, *Blechnum*, *Polystichum*, *Trichomanes*, *Hymenophyllum*, *Lycopodium*, *Danthonia*, *Libertia*, *Astelia*, *Euphrasia*, *Stilbocarpa*, *Rhipogonum*, *Clematis*, *Parsonsia*, *Rubus*, *Coriaria* and *Orchis*. It is for a fertile vivid imagination to visualize such an association centuries old, pure and unmolested; the scene certainly baffles description by a mere horticulturist.

Several mountains are within easy reach, the ascent of which is rendered easy by good tracks maintained by the Government Tourist Department. Mt. Anglem, the highest, is 3,000 feet; Mt. Allen, 2,459 feet; Table Hill, 2,347 feet; Mt. Rakeahua, 2,217 feet. Near the summit of the latter, in January, may be seen an alpine meadow densely covered with *Celmisia* and *Bulbinella*, resembling Daisies and Buttercups in an English meadow; the view from the summit is a delightful panorama—other peaks, foothills, vast sandy wastes, outlying islands with mud flats directly below and a tiny stream of water, which is recognized as the river and its channel, negotiated but a few hours before. The Rakeahua and Freshwater Rivers at the head of Paterson Inlet are tidal, being traversed only in small flat-bottomed launches, closely following the channel defined by a series of sticks. To sail up the river at dawn is an invigorating experience; at every moment the scene changes as the boat twists and turns round myriads of bends, with chiming of birds, sounding through luxuriant growth sweeping right to the water's edge in places where the river



FIG. 1.1 — PARSON INLET, STUART ISLAND

To face p. 445



FIG 122 —STYLOBOCARPA INALII IN THE GARDEN RAROA



FIG. 123 —*MYOSOTIDIUM NOBILE* IN STEWART ISLAND.



FIG. 124.—*ANISOTOME LATIFOLIA* IN THE GARDEN, RAROA.

[To face p. 449.

narrows, and serving as natural archways. Within easy reach from the top of Rakeahua is a waterfall, by no means remarkable in size, but distinctly charming in its setting and the dense clothing of its sides. It definitely repays the moments of sore trial occasioned by springing from rock to rock or amongst great boulders, with a raging torrent perilously near below !

It is to be deplored that deer were introduced many years ago which, under ideal conditions with dense protection, have increased to such an extent that the character of vegetation is rapidly changing. Damage is caused not only by the plants being devoured but through ring-barking of large trees in cleaning their antlers, and the stamping and continuous crushing of undergrowth, which impedes natural regeneration, and leads to the admission of light and ground draught, so fatal to bush—the beginning of its end. By those who understand and witness this loss a cry of alarm is raised, but the problem of control and ridding the still vast impenetrable tracts of country from deer seems beyond man's control. Birds, too, must proportionately decrease as their cover, honey- and berry-producing plants are driven back, while areas are laid waste. By man's interference this sanctuary for indigenous plants and birds may be doomed to early extinction.

Though important as a watering place, Stewart Island is so far unspoilt by modern commercial exploitation. There are no licensed hotels, no newspapers, no motor cars or bicycles, few telephones or wireless sets. Adjacent to the outside world—the Port of Bluff and the mainland is only 15 miles distant—it is removed from its cares and one can enjoy a holiday refreshing for both body and soul. It does not boast organized sports, regarded nowadays as essential to a "popular" resort, though talking pictures are shown once a week in the Public Hall, which is also used for dances. With a total population of about 400, two churches, a school, post office and a few general stores, the inhabitants live a simple, easy life, deriving funds to procure the bare necessities of life from fishing, the Mutton Bird industry, ambergris, tourists and, in the most southerly portion, at Port Pegasus, boat building. After its discovery by Cook, in 1770, sealing, whaling and milling were for a time thriving industries, of which only memories, or romantic stories, linger to-day, though some whale chasers are to be seen at the Norwegian whalers' base in Paterson Inlet. So long as the present order of things endures, Stewart Island should retain its original name, Rakiura—Land of Heavenly Glows—for here is a paradise for man—sea, mountain, forest, birds.

In no garden could perfect freedom be more readily found than in the delightful isolation of these grounds, whose owner has made his territory by untiring effort towards preservation.

THE AWARD OF GARDEN MERIT.—XLI.*

By F. J. CHITTENDEN, F.L.S., V.M.H.

221. IRIS PALLIDA DALMATICA.

Award of Garden Merit, July 5, 1937.

The bearded Irises are so well known that no general description is necessary, and one would think that long familiarity with their presence in gardens would have ensured that everyone was aware of their modest requirements. It may be that the complacency of the old blue flag Iris, which will survive under the most trying conditions, has misled many, and we find them planted in shade, see them struggling for existence in places that better suit the yellow flag of the waterside, and see clumps so crowded that they cannot flower properly. The yellow flag has no beard of hairs upon the three outer petals, but every Iris that has wants full sun, a deep, well-drained not over moist soil and not an acid one, and it needs to be lifted at intervals (usually every third year), divided and replanted so that its thick rhizomes are on the surface of the soil, and this is best done in July.

The past thirty years has seen an enormous increase in the number of varieties of this group of Irises, in the range of colour, and in the range of time over which their flowering is spread. America, France, Germany, and England have all contributed great numbers of varieties, but *I. pallida dalmatica* is surpassed by none. Its fine grey foliage is pleasant to see even when there is no flower, its sturdy stem, height (for it is often 3 feet tall), ample flower, excellent pose, beautiful proportions, and clear lavender-blue colour, combine to place it in the forefront in any company.

Our gardens owe it not to the hybridists' endeavours but to the eye of some discriminating plant hunter many years ago, who found it growing in the limestone hills of the Dalmatian coast.

Like other good plants it has had several different names, the best known of which is 'Princess Beatrice,' a name by which it is still often offered.

If one has ordinary soil in a sunny place and room for but one Iris, *I. pallida dalmatica* may well be the one.

* The notes on the first hundred plants to receive the Award of Garden Merit have been collected from our JOURNAL, vols. 47 to 53, and published as a pamphlet, price 1s. For subsequent notes see vol. 54, pp. 218 and 423; 55, pp. 121 and 276; 56, pp. 80 and 245; 57, pp. 65 and 354; 58, pp. 171 and 400; 59, pp. 131, 308, 360, 406, and 449; 60, pp. 89 and 545; 61, pp. 94, 138, 225, 265, 298, 358, 393, 443, and 486; and 62, pp. 134 and 416.

222. AMARYLLIS BELLADONNA.

Award of Garden Merit, April 16, 1934.

One may expect much beauty from a plant named *Amaryllis Belladonna*. Superlatives could go no further. Linnæus did not err when he bestowed this twice beautiful name upon this very beautiful plant.

It is not every garden that can provide ideal conditions for *A. Belladonna*, for they exist in our islands only in the sun in the mild south-west—in the Scillies, in Cornwall, and in Southern Ireland. But many gardens can give a piece of a border against a warm wall facing south and some can find, as at Wisley, a south slope on a dry and sunny bank where the drainage is sharp; and no plant is more worthy of such a choice spot. There out of the bare and sun-warmed earth are pushed in September the dark enfolded spathes. The thick flattened purple stem reaches 18 inches in length and then the spathes separate and disclose the buds they protected to open successively. There they stand some time, the lovely flared trumpets 3 inches long, each on its 1½ inch stalk, of some shade of rose (for there are several varieties, all worth growing).

There are no leaves in autumn—they come up in January and last till June, and here is a weakness, for they are apt to be damaged by bad weather, and if this happens, as with all bulbs, the flowering in the next year is in jeopardy, and it is thus important to guard these leaves as far as we can.

A. Belladonna was introduced from Cape Colony over two hundred years ago and has been cultivated here ever since. It is figured in the Botanical Magazine t. 733 and again under the name *Coburgia Belladonna* at t. 2113, 2114.

223. ANTHEMIS TINCTORIA, PERRY'S VAR.

Award of Garden Merit, September 10, 1934.

Anthemis tinctoria has been found wild in England on rubbish heaps and the like, but it is a European herbaceous perennial doubtfully native here. It has greyish much cut foliage and a bushy habit, reaching a height, when in flower, of about 18 inches. A single plant may cover a space of 2 feet or more across when not crowded. The yellow daisy-shaped flowers nearly 2 inches across are produced in abundance in July and continue well into autumn.

A. tinctoria has given rise to several colour varieties, e.g. *Kelwaysi* with cream-coloured flowers, 'E. C. Buxton' with canary yellow flowers, and 'Perry's var.', to which the Award of Garden Merit has been given, with golden yellow flowers.

Ordinary well-drained soils suit it and it is hardy provided the soil does not become over-wet in winter. It can be easily increased by division or by cuttings.

Its long-stalked flowers are useful for cutting. Although, as Mr. BOWLES has pointed out in *My Garden in Summer*, they are apt to sulk and turn back their ears for some hours after being cut, they get over the fit and last well if picked before many of the disc florets have shed their pollen.

224. *CARPENTERIA CALIFORNICA*.

Award of Garden Merit, September 9, 1935.

Carpenteria californica is an evergreen shrub usually happy only in the shelter of a south or west wall in sunny places and in the clear air of the country. London fogs do it much damage. It grows to about 6 or 8 feet in height and the spread in well grown plants may be as great as the height. It may succeed quite well in the open in favoured places.

The opposite, entire, short-stalked, narrow, bright green leaves, about 3 inches long, glaucous beneath, are pleasant, but the glory of the plant is in its clusters of sweet-scented white flowers borne in June and July at the ends of the branches. The flowers are each about 3 inches across and the clusters contain 3 to 7 flowers.

Like many plants raised from seed, as this must be, *Carpenteria californica* varies to some extent, particularly in the width of its petals, and it is well to select plants in flower in the nursery so as to get the wider-petalled rounder-flowered forms.

This shrub likes a moist sandy peat, as do so many Californian plants: It was discovered by Colonel Frémont in California in 1846 but did not reach England until 1880 and flowered first at Munstead in Miss JEKYLL's garden, in 1885.

There is a figure in the *Botanical Magazine*, t. 9111.

225. *PARTHENOCISSUS TRICUSPIDATA VEITCHII*.

Award of Garden Merit, June 8, 1936.

No town, no village, and possibly no hamlet in this country would fail to show this climber, so deservedly widely planted has it been. I well remember, on a journey in early autumn from one end of England to the other with the late Sir HARRY VEITCH, his saying that the sight of this plant always made him happy at the part his firm had played in bringing it from Japan, for JOHN GOULD VEITCH had introduced it in 1862. What a happy man Sir HARRY must have been!

Its value lies in the readiness with which young plants accommodate themselves to such a wide variety of soils, its imperturbable hardiness, its habit of clinging to flat surfaces without extraneous support, the rapidity of its growth, the pleasant green of its foliage, and above all, to the glorious crimsons of its autumn dress.

It should always be planted out of pots for it does not transplant well, and wherever an ugly wall or building has to be clothed it may

be used, the only attention it needs being restriction of its growth so that it does not cover windows or trespass under the eaves.

Botanists have been very undecided as to its proper place in classification and at present it is named as at the head of this note, the variety *Veitchii* being the small-leaved form with the young leaves purple. It also appears in catalogues and books as *Vitis inconstans*, *Ampelopsis tricuspidata*, *A. Veitchii*, *A. Hoggii*, *A. japonica*, and a nearly related form as *A. Lowii*. It received F.C.C. when shown by Messrs. VEITCH in 1868.

Species of *Vitis* are distinct in having the petals joined at their tips so that when the flower opens they are pushed off. *Ampelopsis* is distinguishable from *Parthenocissus* by having hooks at the tips of its tendrils instead of adhesive discs as in the latter.

PLANTS TO WHICH AWARDS HAVE BEEN MADE IN 1937.

Begonia 'Bella.' A.M. August 17, 1937. From Messrs. Blackmore & Langdon, Bath. A very distinct double, tuberous rooted variety. The flowers are white edged and flushed with pale rose.

Begonia 'John Langdon.' A.M. August 17, 1937. From Messrs. Blackmore & Langdon, Bath. A large double, tuberous rooted variety with rosy salmon-pink flowers.

Begonia 'N. M. Agnew.' A.M. August 17, 1937. From Messrs. Blackmore & Langdon, Bath. A medium sized, rich yellow, tuberous rooted variety having a lighter shade of colour on the outer sides of the petals. This variety has very attractive marbled leaves.

Erica verticillata var. **major.** A.M. August 31, 1937. This highly attractive Cape Heath for the cool greenhouse is open in habit and with flexuous branches. The flowers are plentiful, set closely together in sub-opposite fascicles or whorls, the corolla tubular and swollen, tapering to the mouth, about $\frac{3}{4}$ inch long, of a clear salmon tint and almost translucent texture. From L. de Rothschild, Esq., Exbury.

Lilium \times **'T. A. Havemeyer.'** A.M. August 17, 1937. From Messrs. R. Wallace, Tunbridge Wells. An interesting hybrid raised in the U.S.A. from the cross *L. Henryi* \times *L. myriophyllum superbum*. The plant exhibited was 4 $\frac{1}{2}$ feet tall, the slightly mottled, arching stem bearing many spreading linear-lanceolate leaves and some axillary bulbils. The inflorescence comprised three flowers with horizontal peduncles about 9 inches long. The flower is 7 inches in diameter, the perianth-segments more or less twisted with recurved tips. The colour is a warm ivory-yellow, suffused with apricot. The midrib of each segment bears externally a longitudinal band of vivid green.

Ornithogalum arableum. A.M. August 17, 1937. From the Viscountess Byng of Vimy, Thorpe-le-Soken. This very striking species has long been in cultivation, but it is by no means a common plant, probably because only freshly imported bulbs can be relied upon to flower freely. It produces a basal cluster of narrowly strap-shaped leaves and a scape about 18 inches long bearing a condensed 6-12-flowered raceme. The large, pearly-white flower is rendered very conspicuous by its glossy, blackish-green ovary.

Rose 'Dainty Maid.' A.M. August 4, 1937. From Mr. E. B. Le Grice, North Walsham. A very charming Hybrid Polyantha variety of vigorous and free-flowering habit. The flowers are single and measure 3 to 3 $\frac{1}{2}$ inches across and are borne singly or in large clusters. The outer side of the petals is carmine and the inner side silvery-pink. Height of plant about 2 $\frac{1}{2}$ feet. The variety was raised by the exhibitor from an unknown seedling.

Thalictrum dipterocarpum 'Hewitt's Double.' A.M. August 17, 1937. From Messrs. Hewitt, Stratford-on-Avon. A double form of this beautiful Chinese herbaceous plant. It is a sport from the type and grows to a height of 6-7 feet. The small violet-mauve flowers are borne in graceful loose branching panicles.

Vuytskeara × 'Memoria H. H. Smith.' A.M. August 31, 1937. The result of crossing *Odontonia* × 'Nesta' with *Odontioda* × *Charlesworthii*, this attractive hybrid bore an erect spike of nine flowers, of which the sepals and petals are crimson-lake, and the wide labellum purplish with a yellow crest area. Raised by Messrs. Charlesworth, Haywards Heath.

HARDY BORDER CARNATIONS.

A JOINT Committee for the judging of Hardy Border Carnations between the Royal Horticultural Society and the National Carnation and Picotee Society having been set up, arrangements were made in 1935 for the formation of a standard collection of Hardy Border Carnations at Wisley and for a trial of new seedlings to be judged in 1936.

The purpose of the trial of Hardy Border Carnations at Wisley is a twofold one—to enable varieties to be selected for their value as garden plants, and to test the hardiness of varieties suitable for show—for some may be suitable for exhibition which do not give a good account of themselves in the ordinary garden, but they must be hardy.

The Awards recommended in 1936 as shown below are for value as hardy garden plants only.

Amateurs and trade growers were invited to contribute to the formation of a standard collection by sending three plants of each variety, and these were planted in the second week of October 1935 at Wisley. One hundred and twenty-six varieties were sent and all made good growth, and were judged by the Joint Committee on July 16 and July 30, 1936.

The standard collection will be maintained at Wisley and used for comparison of new varieties as they are selected for trial.

White Selfs.

Cottage White (raised and sent by Messrs. Allwood of Haywards Heath, Sussex). **C.** July 16, 1936.—2 feet. Plant somewhat bushy, very free flowering; flower stems stout, rigid; flowers $2\frac{1}{2}$ inches diameter, petals broad, almost entire, white; calyx strong.

The following varieties were included in the trial and are retained for future judgment:

BORDER WHITE (Allwood).	ELAINE (Allwood).
EDENSIDE WHITE (Fairlie).	INEZ (Gibson).

The following varieties have been discarded:

ARCTIC CLOVE (Gibson).	SNOW CLOVE (Allwood).
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Yellow Selfs.

Ettrickdale (raised by Mr. Douglas and sent by Messrs. Allwood). **H.C.** July 16, 1936.— $2\frac{1}{2}$ feet. Plant of vigorous, bushy habit, free flowering; flowers $2\frac{1}{2}$ inches diameter, full centred; petals broad, entire, light sulphur-yellow; calyx burst.

Beauty of Cambridge (raised by Messrs. Bath and sent by Messrs. Allwood). **H.C.** July 16, 1936.—20 inches. Plant of bushy habit, producing good "grass"; flower stems stout, rigid; flowers $2\frac{1}{2}$ inches

diameter, freely produced, solid ; petals broad, almost entire, bright sulphur-yellow ; calyx strong.

Yellow Beauty (raised by Messrs. Bath and sent by Messrs. Allwood). C. July 16, 1936.—20 inches. Plant of bushy habit, very free flowering ; flower stems stout, rigid ; flowers $2\frac{1}{2}$ inches diameter, centre crowded ; petals broad, entire ; calyx burst.

The following variety was included in the trial and has been retained for future judgment :

MARY MURRAY (Gibson).

The following varieties have been discarded :

MISS A. CAMPBELL (Allwood). SOLFATERRE (Allwood).

PETER (Allwood).

Apricot Shades.

Bella M. Grier (raised and sent by R. M. Grier, Esq., of Barrhead). H.C. July 30, 1936.— $2\frac{1}{2}$ feet. Plant vigorous, of bushy habit and free flowering ; flower stems stout, rigid ; flowers $2\frac{1}{2}$ inches diameter, full centred ; petals broad, entire, bright pale apricot ; calyx strong.

Consul (raised by Messrs. Bath and sent by Messrs. Allwood of Haywards Heath, Sussex). H.C. July 30, 1936.—26 inches. Plant somewhat spreading and very free flowering ; flower stems stout, rigid ; flowers $2\frac{1}{2}$ inches diameter, centre loose ; petals broad, entire, deep rich scarlet-apricot, retaining its colour well ; calyx strong.

Cranleigh (raised by Messrs. Lowe & Gibson and sent by Messrs. Gibson of Cranleigh). H.C. July 16, 1936.—20 inches. Plant of bushy habit, free flowering ; flower stems stout, very rigid ; flowers $2\frac{1}{2}$ inches diameter, centre somewhat full ; petals broad, entire, bright apricot ; calyx burst.

Akbar (sent by Messrs. Allwood). C. July 30, 1936.—20 inches. Plant bushy ; flower stems stout, rigid ; flowers $2\frac{1}{2}$ inches diameter, full centred, freely produced ; petals broad, entire, soft pinkish apricot ; calyx strong.

Elizabeth Shiffner (raised by Mr. Douglas and sent by Messrs. Allwood). C. July 30, 1936.—26 inches. Plant of good bushy habit and free flowering ; flower stems stout, rigid ; flowers $2\frac{1}{2}$ inches diameter, full centred ; petals broad, entire, bright apricot-buff ; calyx strong.

The following varieties were included in the trial and are retained for future judgment :

EFFIE DEAN (Allwood).

MRS. A. T. KEMBLE (Allwood).

LOYALTY (Allwood).

NANCY CHURCHER (Gibson).

The following variety has been discarded :

GOLIATH (Allwood).

Pink Shades.

Salmon Clove (sent by Messrs. Allwood). H.C. July 16, 1936.—26 inches. Plant bushy, free flowering ; stems stout, rigid ; flowers $2\frac{1}{2}$ inches diameter ; petals broad, entire, rich salmon-cerise ; calyx strong.

The Royal Clove (raised by Mr. Douglas and sent by Messrs. Allwood). H.C. July 16, 1936.—20 inches. Plant bushy; stems stout, rigid; flowers $2\frac{3}{4}$ inches diameter, full centred; petals broad, entire, deep salmon-cerise; calyx strong.

Innocence (sent by Messrs. Allwood). C. July 30, 1936.—20 inches. Plant bushy and extremely free flowering; stems stout, rigid; flowers $2\frac{3}{4}$ inches diameter, centre rather loose; petals broad, entire, shell pink; calyx strong.

Teviotdale (sent by Messrs. Allwood). C. July 30, 1936.— $2\frac{1}{4}$ feet. Plant bushy but produces little "grass"; stems stout, rigid; flowers $2\frac{1}{4}$ inches diameter, loose centre, very freely produced; petals broad, entire, very bright rich scarlet-cerise; calyx weak.

The following varieties were included in the trial and are retained for future judgment:

DELICOSA (Allwood).

EGLANTINE CLOVE (Allwood).

DORA SPENLOW (Allwood).

NAUTILUS (Allwood).

The following varieties have been discarded:

LAVEROCK CLOVE (Allwood).

SHRIMP (Allwood).

Scarlet Shades.

Grenadier (sent by Messrs. Allwood). A.M. July 30, 1936.—2 feet. Plant somewhat spreading, free flowering; stems stout, rigid; flowers $2\frac{1}{2}$ inches diameter; petals broad, entire, deep rich scarlet; calyx strong.

Flambeau (raised by Messrs. Lakeman and sent by Messrs. Allwood). H.C. July 16, 1936.—22 inches. Plant spreading, producing little "grass"; stems stout, rigid; flowers $2\frac{1}{4}$ inches diameter, of good form, freely produced; petals broad, entire, bright orange-flame; calyx strong.

Scarlet Clove (sent by Messrs. Allwood). H.C. July 16, 1936.—20 inches. Plant spreading; stems stout, rigid; flowers $2\frac{1}{4}$ inches diameter, centre rather loose but of good form, clove scented; petals broad, entire, bright scarlet; calyx strong.

Cottage Scarlet (raised and sent by Messrs. Allwood). C. July 30, 1936.—15 inches. Very compact and bushy habit; stems medium, rigid; flowers 2 inches diameter, flowering freely, centre rather open; petals broad, entire, bright rich scarlet; calyx strong.

Montrose (raised by Mr. Douglas and sent by Messrs. Allwood). C. July 30, 1936.— $2\frac{1}{2}$ feet. Habit bushy, robust with good "grass"; stems rather slender and inclined to droop; flowers $2\frac{3}{4}$ inches diameter, very freely produced with open centres; petals broad, entire, rich scarlet; calyx strong.

The following variety was included in the trial and is retained for future judgment:

RIFLEMAN (Allwood).

The following variety has been discarded:

GLOWING CLOVE (Gibson).

Old Rose.

Naomi Ellis (raised by Mr. G. D. Murray and sent by Messrs. Gibson of Cranleigh). **H.C.** July 16, 1936.—2 feet. **Habit** bushy ; stems stout, rigid ; flowers $2\frac{1}{2}$ inches diameter, freely produced, centre rather open ; petals broad, entire, dull old rose, keeping its colour well ; calyx strong.

Miss Rose Josephs (sent by Messrs. Allwood). **C.** July 16, 1936.—26 inches. Plant of bushy habit and free flowering ; stems stout, rigid ; flowers $2\frac{1}{2}$ to $2\frac{1}{4}$ inches diameter, open centre ; petals broad, entire, dull old rose ; calyx strong.

Crimson Shades.

Countess of Lonsdale (raised and sent by Messrs. Gibson of Cranleigh). **A.M.** July 16, 1936.—18 inches. **Habit** bushy, with broad, robust foliage ; stems stout, rigid ; flowers $2\frac{1}{2}$ inches diameter, of good form and substance, clove scented, freely produced ; petals broad, entire, rich crimson ; calyx strong.

Gordon Douglas (raised by Mr. Douglas and sent by Messrs. Allwood). **A.M.** July 16, 1936.— $2\frac{1}{2}$ feet. **Habit** rather spreading ; stems stout, rigid ; flowers $2\frac{1}{2}$ inches diameter, very freely produced, clove scented, centre rather open ; petals broad, entire, deep rich crimson ; calyx weak.

Cottage Crimson (raised and sent by Messrs. Allwood). **H.C.** July 16, 1936.—18 inches. **Habit** bushy and compact ; stems stout, rigid ; flowers $2\frac{1}{2}$ inches diameter, full centre, freely produced ; petals broad, entire, rich crimson ; calyx strong.

Joan Wardale (sent by Messrs. Allwood). **H.C.** July 30, 1936.—18 inches. Plant bushy ; stems stout, rigid ; flowers $2\frac{1}{2}$ inches diameter, open centre, freely produced ; petals broad, deep rich crimson with a velvety effect ; calyx strong.

Mrs. Evelyn Lake (sent by Messrs. Allwood). **H.C.** July 30, 1936.— $2\frac{1}{2}$ feet. **Habit** spreading, producing a second crop of flowers in the early autumn ; stems stout, rigid ; flowers $2\frac{1}{2}$ inches diameter, open centre, sweetly scented, freely produced ; petals broad, entire, deep rich crimson ; calyx strong.

Oakfield Clove (raised by Mr. Lowe and sent by Messrs. Allwood). **H.C.** July 16, 1936.—2 feet. Plant of bushy habit ; stems stout, rigid ; flowers $2\frac{1}{2}$ inches diameter, full high centre, clove scented, freely produced ; petals broad, almost entire, rich crimson ; calyx burst.

Windsor Clove (raised and sent by Mr. Chas. H. Cook, also sent by Messrs. Allwood). **H.C.** July 30, 1936.— $2\frac{1}{2}$ feet. **Habit** vigorous, bushy ; stems stout, rigid ; flowers $2\frac{1}{2}$ inches diameter, full centred, heavily clove scented and very freely produced ; petals broad, entire, deep rich crimson, spots with the weather ; calyx strong.

Maroon Clove (sent by Messrs. Allwood). **C.** July 30, 1936.—22 inches. Bushy habit, stems stout, rigid ; flowers $2\frac{1}{2}$ to $2\frac{3}{4}$ inches

diameter, very freely produced, full centred and clove scented ; petals broad, somewhat fringed, deep crimson-maroon ; calyx burst.

The following varieties have been discarded :

BOOKHAM CLOVE (Gibson).
FRAGRANCE (Allwood).

OLD CRIMSON CLOVE (Allwood).
SWINLEY RUBY (Allwood).

Mauve and Lilac Shades.

Raymond Howe (raised and sent by J. H. Fraser, Esq., of Pickering, Yorks). **A.M.** July 30, 1936.—2½ feet. Habit bushy ; stems stout, rigid ; flowers 2½ inches diameter, freely produced ; petals broad, entire, light lilac-mauve ; calyx strong.

Robin Gray (sent by Messrs. Allwood). **H.C.** July 16, 1936.—2½ feet. Plant vigorous, bushy habit ; stems stout, rigid ; flowers 2½ inches diameter, full centred, somewhat clove scented and flowering freely ; petals broad, almost entire, rich lilac-mauve ; calyx strong.

Glen Shée (raised by Mr. Campbell and sent by Messrs. Allwood). **C.** July 16, 1936.—32 inches. Plant of spreading habit with rather weak stems ; flowers 2½ inches diameter, open centre, somewhat clove scented and flowering freely ; petals broad, entire, pale pinkish-mauve ; calyx strong.

Mrs. H. A. Knapton (raised by Mr. G. D. Murray and sent by Messrs. Gibson of Cranleigh). **C.** July 30, 1936.—20 inches. Habit bushy, with stout and rigid stems ; flowers 2½ inches diameter, rather open centre and flowering freely ; petals broad, entire, lilac-mauve ; calyx strong.

The following varieties were included in the trial and are retained for future judgment :

COTTAGE MAUVE (Allwood).
BORDER MAUVE (Allwood).

LAVENDER CLOVE (Allwood).
MISTY MORNING (Gibson).

The following variety has been discarded :

MRS. FRANK ATTHILL (Stephenson).

Fancies.

Ebor (raised by Mr. Douglas and sent by Messrs. Allwood). **A.M.** July 16, 1936.—30 inches. Plant vigorous and of bushy habit with stout and rigid flower stems ; flowers 2½ inches diameter with rather open centres, somewhat clove scented and flowering very freely ; petals broad, entire, old rose flaked with scarlet and crimson ; calyx strong.

Evening Glow (raised and sent by Messrs. Allwood). **H.C.** July 30, 1936.—2 feet. Plant of bushy and compact habit with stout and rigid stems ; flowers 2½ to 2¾ inches diameter, full centre, freely produced ; petals broad, entire, bright apricot tinged and flaked bright heliotrope-rose ; calyx strong.

Arna Rides (raised by Mr. G. D. Murray and sent by Mr. F. E. Gray of Woodford Green, Essex). **C.** July 16, 1936.—26 inches. Plant of rather spreading habit with stout, rigid stems ; flowers 2½ to 2¾ inches

diameter, centre open, slightly clove scented ; petals broad, entire, dull old rose flaked with dull rosy-crimson ; calyx strong.

Ida Gray (raised by Mr. G. D. Murray and sent by Mr. F. E. Gray). C. July 30, 1936.—18 inches. Habit bushy with stout, rigid stems ; flowers $2\frac{1}{2}$ inches diameter, somewhat clove scented, freely produced ; petals broad, entire, bright cerise banded and striped with pale heliotrope ; calyx strong.

Sam Griffiths (raised by Mr. G. D. Murray and sent by Messrs. Gibson of Cranleigh). C. July 30, 1936.—2 feet. Of bushy habit with stout, rigid flower stems which are somewhat weak at the neck ; flowers $2\frac{1}{2}$ inches diameter, very freely produced, with rather full centres ; petals broad, entire, bright pale heliotrope striped with bright cerise ; calyx burst.

The following variety was included in the trial and has been retained for future judgment :

J. E. COID (Gibson).

The following varieties have been discarded :

BORDER FLAKE (Allwood).

GLENIFFER (Grier).

GLORIA (Allwood).

OPALESCE (Allwood).

PEACH BLOSSOM CLOVE (Allwood).

SALOME (Allwood).

SILVER HUE (Allwood).

White Ground Fancies.

Alice Forbes (raised by Mr. G. D. Murray and sent by Messrs. Allwood). A.M. July 30, 1936.—20 inches. Habit bushy with stout and rigid stems ; flowers $2\frac{1}{2}$ to $2\frac{3}{4}$ inches diameter, very freely produced, centre rather open ; petals broad, entire, white flaked and edged with rose ; calyx strong.

Bookham Lass (raised by Mr. Douglas and sent by Messrs. Allwood). A.M. July 30, 1936.—2 feet. Plant vigorous and of bushy habit ; stems stout, rigid ; flowers $2\frac{1}{2}$ inches diameter, freely produced, centre rather open ; petals broad, creamy-white very sparsely striped with bright rosy-purple ; calyx strong.

Columbine (sent by Messrs. Allwood). A.M. July 30, 1936.— $2\frac{1}{2}$ feet. Habit slightly spreading with stout, rigid stems ; flowers $2\frac{1}{4}$ to $2\frac{3}{4}$ inches diameter, centre slightly open, freely produced ; petals broad, entire, white flaked near the margins with bright carmine ; calyx strong.

Edenside Clove (raised by Mr. Douglas and sent by Messrs. Allwood). A.M. July 30, 1936.—22 inches. Habit robust and bushy, foliage very broad ; stems stout and rigid ; flowers $2\frac{1}{2}$ inches diameter, centre rather open, clove scented and very freely produced ; petals broad, entire, white heavily flaked with rose-crimson ; calyx strong.

Galaxy (raised by Mr. Woolman and sent by Messrs. Gibson of Cranleigh). A.M. July 30, 1936.—27 inches. Habit bushy ; stems stout and rigid ; flowers 3 inches diameter, open centre, somewhat clove scented and flowering freely ; petals broad, entire, white pencilled with rose ; calyx burst. A sport from Mrs. Ed. Charrington.

Glen Glory (raised by Mr. Campbell and sent by Messrs. Allwood). A.M. July 16, 1936.—2 feet. Plant rather spreading with stout, rigid

stems ; flowers $2\frac{1}{2}$ to $2\frac{1}{4}$ inches diameter, somewhat scented ; petals broad, entire, white narrowly edged and sparsely striped pale rosy-red ; calyx strong.

Limpsfield Fancy (raised by Ed. Charrington, Esq., and sent by Messrs. Gibson of Cranleigh). **A.M.** July 16, 1936.— $2\frac{1}{2}$ feet. Plant rather spreading with very broad foliage and stout, rigid stems ; flowers $2\frac{1}{2}$ inches diameter, centre open, slightly clove scented, free flowering ; petals broad, entire, white edged and lightly pencilled with rosy-red ; calyx strong.

Merlin Clove (raised by Mr. Jas. Douglas and sent by Messrs. Gibson of Cranleigh). **A.M.** July 16, 1936.—26 inches. Bushy habit ; stems stout, rigid ; flowers $2\frac{1}{2}$ to $2\frac{3}{4}$ inches diameter, centre somewhat open, clove scented, freely produced ; petals broad, entire, white edged and flaked rosy-crimson ; calyx strong.

Mrs. Edmund Charrington (sent by Messrs. Allwood). **A.M.** July 30, 1936.—22 inches. Plant of spreading habit with stout, rigid stems ; flowers $2\frac{1}{2}$ to $2\frac{3}{4}$ inches diameter, centre very full, clove scented and flowering freely ; petals broad, entire, white pencilled with pale heliotrope ; calyx burst.

Steerforth Clove (sent by Messrs. Allwood). **A.M.** July 30, 1936.—26 inches. Bushy habit ; stems stout, rigid ; flowers $2\frac{1}{2}$ to $2\frac{3}{4}$ inches diameter, clove scented, centre rather open, free flowering ; petals broad, entire, white flaked and edged crimson-maroon ; calyx strong.

Border Fancy (raised and sent by Messrs. Allwood). **H.C.** July 30, 1936.—28 inches. Bushy habit, with stout and very rigid stems ; flowers $2\frac{1}{2}$ to $2\frac{3}{4}$ inches diameter with high full centres, clove scented, flowering freely ; petals broad, entire, white lightly pencilled with scarlet ; calyx strong.

Esme Murray (raised by Mr. Murray and sent by Messrs. Allwood). **H.C.** July 30, 1936.— $2\frac{1}{2}$ feet. Plant somewhat spreading with stout and rigid stems ; flowers $2\frac{1}{2}$ to 3 inches diameter, full centre, somewhat clove scented, freely produced ; petals broad, entire, white flaked and edged with rosy-cerise ; calyx strong.

Lord Kitchener (sent by Messrs. Allwood). **H.C.** July 30, 1936.—28 inches. Plant of compact, bushy habit and free flowering ; stems stout, rigid ; flowers $2\frac{1}{2}$ to $2\frac{1}{2}$ inches diameter, full centre ; petals broad, entire, dull white flaked and edged with scarlet ; calyx strong.

Mrs. A. Brotherston (sent by Messrs. Allwood). **H.C.** July 30, 1936.—28 inches. Plant of upright, bushy habit and free flowering with stout, rigid stems ; flowers $2\frac{1}{2}$ to $2\frac{3}{4}$ inches diameter, very full centre, clove scented ; petals broad, entire, white very heavily speckled and flaked with bright reddish-crimson ; calyx strong.

E. M. Stephenson (raised and sent by Mrs. E. M. Stephenson of Elmstead, nr. Colchester). **G.** July 16, 1936.—22 inches. Plant bushy with medium and semi-rigid flower stems ; flowers $2\frac{1}{2}$ inches diameter, centre rather loose, clove scented ; petals broad, entire, white pencilled and flaked with rosy-magenta ; calyx strong.

Florence Wellstead (raised by Mr. G. D. Murray and sent by Messrs. Gibson of Cranleigh). C. July 30, 1936.—2½ feet. Plant slightly spreading with no "grass"; stems stout, rigid; flowers 2½ to 2¾ inches diameter, somewhat clove scented and very free flowering; petals broad, entire, white edged and lightly flaked bright scarlet; calyx strong.

The following varieties were included in the trial and have been retained for future judgment:

BARBARA MORRIS (Gibson).
BOOKHAM BEAU (Allwood).
BORDER BEAUTY (Allwood).

BOUROCK (Grier).
JOHN STOBART (Gibson).

The following varieties have been discarded:

ARTHURLIE (Grier).

RAVENSWOOD (Allwood).

Yellow Ground Fancies.

Hadrian (sent by Messrs. Allwood). A.M. July 30, 1936.—26 inches. Plant bushy with stout and rigid flower stems; flowers 2½ inches diameter, slightly open centre, very free flowering; petals broad, entire, buff ground suffused scarlet and flaked dull maroon; calyx strong.

Centurion (sent by Messrs. Allwood). H.C. July 16, 1936.—20 inches. Plant of bushy and stocky habit with stout, rigid flower stems; flowers 2¼ to 2½ inches diameter, full centre and freely produced; petals broad, entire, sulphur pencilled and edged bright scarlet; calyx strong.

David Stobart (sent by Messrs. Allwood). H.C. July 16, 1936.—2 feet. Plant somewhat spreading with stout, rigid stems; flowers 2½ to 2¾ inches diameter, full centre and flowering freely; petals broad, entire, bright rich pinkish-apricot flaked heliotrope; calyx burst.

Florence Grisby (raised by Mr. G. D. Murray and sent by Messrs. Allwood). H.C. July 30, 1936.—1½ feet. Plant bushy and compact with medium but rigid flower stems, flowering freely; flowers 2¾ inches diameter, centre rather open; petals broad, entire, pale sulphur-yellow, broadly edged and marked rosy-scarlet; calyx strong.

Linkman (sent by Messrs. Allwood). H.C. July 16, 1936.—2½ feet. Plant somewhat spreading with rather weak flower stems; flowers 2½ inches diameter, centre rather open; petals broad, entire, pale bright yellow flaked and edged bright scarlet; calyx strong.

Shella Gibson (sent by Messrs. Allwood). H.C. July 30, 1936.—2½ feet. Plant of straggling habit with stout, rigid flower stems; flowers 2½ inches diameter, centre rather open and very freely produced; petals broad, entire, pale apricot suffused and flaked with heliotrope; calyx strong.

Allan-a-Dale (raised by Mr. J. Firth and sent by Messrs. Allwood). C. July 30, 1936.—1½ feet. Plant of bushy habit with stout and rigid stems; flowers 2½ inches diameter, centre open, and flowering freely;

petals broad, entire, cream lightly edged and sparsely pencilled with crimson ; calyx strong.

Ben More (sent by Messrs. Allwood). C. July 16, 1936.—3 feet. Plant of spreading habit with little "grass" ; stems stout, rigid ; flowers $2\frac{1}{2}$ to $2\frac{3}{4}$ inches diameter, open centre, flowering freely ; petals broad, entire, sulphur lightly pencilled and edged with carmine ; calyx strong.

Dainty (raised and sent by Messrs. Allwood). C. July 30, 1936.—20 inches. Plant of compact and bushy growth with stout, rigid stems ; flowers $2\frac{1}{2}$ to $2\frac{3}{4}$ inches diameter, very freely produced, clove scented, centre rather open ; petals broad, entire, pale apricot suffused and flaked pale cerise ; calyx strong.

Flamingo (sent by Messrs. Allwood). C. July 16, 1936.—2 feet. Plant of straggling growth with stout, rigid flower stems ; flowers $2\frac{1}{2}$ to $2\frac{3}{4}$ inches diameter with full centre ; petals broad, entire, light apricot suffused, flaked and edged bright scarlet ; calyx strong.

Mrs. T. B. Beckett (sent by Messrs. Allwood). C. July 30, 1936.—2 feet. Habit slightly spreading with stout, rigid flower stems ; flowers 2 to $2\frac{1}{2}$ inches diameter, centre open, flowering freely ; petals broad, entire, pale lemon flaked and margined with rosy-cerise ; calyx strong.

W. H. Brooks (raised by Mr. Jas Douglas and sent by Messrs. Gibson of Cranleigh). C. July 30, 1936.— $2\frac{1}{2}$ feet. Plant spreading with stout, rigid stems ; flowers $2\frac{1}{2}$ inches diameter, centre open, flowering freely ; petals broad, entire, pale sulphur edged and lightly flaked scarlet ; calyx strong.

The following varieties were included in the trial and have been retained for future judgment :

CLEMENT (Allwood).	SKIRMISHER (Allwood).
GOLDEN RAY (Allwood).	ZEBRA (Allwood).

The following varieties have been discarded :

IVAN LOWE (Allwood).	MRS. J. J. KEEN (Gibson).
JOHN GILMOUR (Grler).	VICEROY (Allwood).

Picotees.

Paragon (sent by Messrs. Allwood). C. July 30, 1936.—28 inches. Plant bushy, with stout and rigid flower stems ; flowers $2\frac{1}{2}$ inches diameter, open centre, flowering freely ; petals broad, entire, pale clear yellow edged reddish-crimson ; calyx strong.

Santa Claus (sent by Messrs. Allwood). C. July 30, 1936.—26 inches. Plant of spreading habit with medium rigid flower stems ; flowers 2 to $2\frac{1}{2}$ inches diameter, open centre, slightly clove scented ; petals broad, entire, pale sulphur edged rosy-crimson ; calyx strong.

The following varieties were included in the trial and have been retained for future judgment :

FAIR MAIDEN (Allwood).	RED BRAES (Allwood).
PAULINE (Stephenson).	

BOOK REVIEWS.

"Gewächshäuser und Heizungen." By Alfred Demnig. 8vo. 95 pp. (Ulmer, Stuttgart, 1937.) 2.80 Mk.

This is No. 32 of a series of booklets dealing with the advances in horticulture, issued under the editorship of Prof. C. F. Rudloff. After the usual historical introduction, the author deals with the best types of greenhouses suitable for different kinds of plants. He passes on to the construction of the houses, dealing with the wood, metal and glasswork. He has also something to say about the aspect and the inclination of the glass as well as of its thickness. He discusses the question of ventilation with some thoroughness, and describes various methods of shading with colour washes or blinds made from a great variety of materials. The second section deals with methods of heating, and describes both the system of pipes and the structure of boilers. Steam-heating, water-heating and electric-heating are all fully described, and the advantages and disadvantages of various kinds of fuel as well as their respective costs are discussed. For conditions in Germany the booklet will prove very useful.

F. E. WEISS.

"Cordon Culture of Apples." By H. Patience. 8vo. 60 + xii pp. (Cheshire, Kidderminster, 1936.)

A great deal of sound instruction concisely expressed is packed into this little book, which those who intend to grow apples as cordons would do well to consult.

Every phase of cultivation and harvesting is dealt with, always clearly and briefly. The excellent photographs which illustrate the book help the text.

"The Present Day Rock Garden. Being a complementary volume to Farrer's English Rock Garden." By Sampson Clay, M.A., Ph.D. 8vo. 681 pp. (Jack, London, 1937.) 31s. 6d.

Nearly eighteen years have elapsed since Farrer's classical work made its first appearance. "If it serves for even a decade," he wrote, he would be satisfied. No apology is needed for the compilation of this book, which is the natural sequence to Farrer's "English Rock Garden." As a matter of fact an eager horticultural world has been anxiously waiting for its birth and is grateful to Dr. Clay for its delivery.

Naturally the volume invites comparison with the master's. Farrer relied largely on the chief botanists of the world, whose volumes he ransacked, but in addition he gave us his own experience as a field-botanist and the results of his experimental gardening. He has the personal touch which beginners may miss in the present volume. Dr. Clay relies on herbaria, the experience of plant collectors and cultivators and last, but not least, on monographs recently published, to wit: *Sedum*, *Sempervivum*, *Gentiana*, *Meconopsis*, *Lilium* and others. Many readers may miss Farrer's sprightly language but some may be grateful for a more sober account. However, more frequent notes on cultivation of the lesser known species, for instance that puzzling *Viola* illustrated on plate 54 would be a distinct advantage. We are grateful for the inclusion of many Monocotyledons which were rather neglected by Farrer, for the extension of the chapter on Orchids and for the addition of many species suitable for the English Alpine garden and new to cultivation. Extensive paragraphs on *Astragalus*, *Azorella*, *Calceolaria*, *Celmisia*, *Codonopsis*, *Corydalis*, *Cyananthus* and *Viola*, to mention only a few, must be welcome to many not possessed of monographs. The book whets the appetite for Andean plants, but relatively few are in cultivation. It seems a pity that some amateurs and Botanical Gardens are indifferent to distributing seed or surplus plants. In some cases plants are shy seeders or seed must be collected while the pod is still green (*Corydalis*!), again others ripen only under a very long period of exposure to sunlight (*Phyteuma comasum*!).

The preface is an apologia for plants both included or left out of the book, also an evasion of the impossible definition of an alpine plant intermingled with sly digs at taxonomists and botanists. We confess that we cannot always follow Dr. Clay on this line of approach. Very welcome are the notes on synonyms, and the two indexes are valuable. The illustrations are excellent, the paper and print good, but the binding is as unsatisfactory as Farrer's first issue. Surely a volume of this merit deserves better treatment! There are very few printing mistakes.

The "Present Day Rock Garden" is a necessity for all bent on cultivating "alpines" or interested in the lighter side of botany. It was a pleasant task to review the volume when on a holiday high up in the mountains.

P. ROSENHEIM.

"Insects of the British Woodlands." By R. Neil Chrystal. 8vo. xiii + 338 pp.; 33 plates. (Warne, London, 1937.) 7s. 6d. net.

No group of insects has been so neglected in this country as that which attacks forest trees. Only one text-book, namely, "Forest Entomology," by A. T. Gillanders, has previously appeared and that in 1908, with a second edition in 1912. To neglect the enemies of any crop or plant association would appear to signify a lamentable lack of interest by plantmen in that particular crop or association, and that this is true so far as British Forestry is concerned is apparent from the dearth of entomological text-books dealing with the enemies of forest trees and timber. It is well to remember, however, that a considerable amount of literature in the form of bulletins, papers and leaflets exists in this country, but much of it is not readily accessible to the forester.

Dr. Chrystal, who is the Chief Entomologist at the Department of Forestry, University of Oxford, deserves the gratitude of all foresters and those whose aim is the preservation of our trees by his production of a book which is of outstanding merit.

This book is more than a mere treatise on the insect life of British woodlands, for it is a veritable mine of information on insect life in general, and should have a far wider appeal than the title would suggest. Not only are the principal pests of trees considered in detail, but there is a vast amount of information dealing with the anatomical structure of insects, their metamorphoses, the biological grouping of insects, forest relations, keys to the types of insect larvæ and a concise classification, so that the work is of value not only to the entomologist and forester, but to every student who is interested in the relationships between plants and insects.

The horticulturist will find much to admire and to absorb in the text, though there are some who will wish that the author had more to say of the pests of ornamental trees and shrubs.

The relationships between insects and ornamental trees are very different from those of forest trees, while the measures for controlling pests in forests compared with their control in parks and gardens are comparable only to a small degree. It will be the earnest wish of every tree-lover that the author should write a companion volume dealing with the insect pests of ornamental trees and shrubs along the lines of the American manuals.

The book is well illustrated with photographs of injuries committed by forest insects and with excellent line drawings of many of the more important pests of woodland trees.

There are two Appendices, one describing some important forest insect genera and species, the other giving a list of the more important forest insects described in the text together with their host trees.

A short bibliography of books and of bulletins, papers and leaflets is given, while the general index is excellent.

The price is reasonable, and this book should find a prominent place on the shelves of every horticulturist and forester.

G. FOX WILSON.

"Lawns." Ed. 15. 60 pp. (Sutton, Reading, 1937.) 1s. 6d.

This little book is too well known to need review, and we welcome a new edition.

"Iris Culture for Amateurs." By R. E. S. Spender and L. F. Pesel. 8vo. 151 pp. (Country Life, London, 1937.) 5s.

This is a useful little book, and should encourage many gardeners to take up the growing of Irises more extensively. The Iris calendar at the end of the book is particularly good, showing as it does how Iris species will flower in the open garden all the year round, and giving the times of year the different species should be moved or broken up—an important point. Most of the book is given up to the description, cultivation and arrangement of the tall, bearded hybrid Iris. There is an excellent list of these hybrids under their colours with the raiser's name, which is quite up to date. The last chapters on colour planting and the planning of Iris gardens are quite a new departure in Iris literature, and are the best chapters in the book.

It is a pity that the species have been so scantily dealt with. *Iris Hoogiana* is not even mentioned. This *Iris* is just as easy to grow as any Spanish *Iris*, and is one of the most beautiful species in existence. Another omission is the true *I. pumila*, that lovely little Grecian *Iris* which revels in the sunny parts of the rock garden. The authors seem to consider the *Oncocyclus Iris* "too difficult" to mention. These wonderful plants are just the *Irises* that the amateur should try and will probably succeed with, as they require careful cultivation and a good deal of attention. The success in flowering such glorious plants as *I. Galesii*, *I. Lorteti* and *I. auranitica* will amply repay the trouble taken in their cultivation.

F. C. STERN.

"Commercial Flower Production." Pt. I. 8vo. 77 pp. (Bull. 96. Ministry of Agriculture. (H.M. Stationery Office, London, 1936.) 2s. 6d.

This Bulletin, prepared by Dr. H. V. Taylor and Dr. K. H. Johnstone, deals with spring flowers and flowers grown under glass marketable as cut flowers.

The flowers to which sections are devoted are *Allium neapolitanum*, *Anemone*, *Anthurium*, *Arum*, *Camellia*, *Carnation*, *Christmas Rose*, *Doronicum*, *Eucharis*, *Euphorbia*, *Forsythia*, *Freesia*, *Gardenia*, *Gerbera*, *Gladiolus*, *Hyacinth*, *Iris*, *Ixia*, *Lapageria*, *Leucocoryne*, *Lilac*, *Lily*, *Lily of the Valley*, *Marguerite*, *Marigold*, *Mimosa*, *Myosotis*, *Narcissus*, *Nerine*, *Orchids*, *Poinsettia*, *Polyanthus*, *Primrose* and *Cowslip*, *Ranunculus*, *Rose*, *Scilla*, *Snowdrop*, *Spiraea*, *Stephanotis*, *Stock*, *Sweet Pea*, *Trollius*, *Tulip*, *Violet*, and *Wallflower*. A few others are also mentioned.

For each, after a general note, varieties suitable for market are mentioned, followed by notes on soils, cultivation, propagation, cutting and marketing, and, where important, diseases and pests. Interesting figures of production are also frequently quoted.

Much useful information for growers for market is contained in this Bulletin.

"Adventures with Hardy Bulbs." By Louise Beebe Wilder. 8vo. xii + 364 pp. (Macmillan, New York, 1936.) 25s.

Although written for American gardeners this charming book contains much to interest all who believe that of all kinds of plants those that gardeners call bulbous are the most fascinating.

Mrs. Wilder is careful to explain that she includes not only the true bulbs of the botanists, which possess underground resting buds composed of fleshy scales, but plants having corms, tubers or rhizomes have been allowed to join the select company. Therefore a vast number of well-known favourites are dealt with and many rare or seldom grown plants are recommended for trial.

Her adventures are of two kinds. First those she has encountered in growing a rich and varied collection of good plants in her own garden. The others belong to the land of dreams and desires and are the result of wide and careful reading of the successes of others with plants she has not been able to acquire. Quarantine regulations have made it difficult for American amateur gardeners to obtain plants that are not in the hands of their nurserymen and have prevented them doing the pioneer work in introducing good things to their gardens which is the useful rôle of the adventurous amateur.

Part I contains four short chapters written with the blend of charming simplicity and practical authority we expect and always find in Mrs. Wilder's writings. Those dealing with the case of little bulbs in the back garden and of naturalizing bulbs contain many hints useful to British gardeners.

Part II is a very comprehensive list of plants arranged in alphabetical order according to Genera and therefore very easy to consult. Each plant is fully described in simple, non-technical language and not only practical suggestions for cultivation but also extremely interesting references to the history, habits, structure and uses are given so freely that one marvels at the extent of the reading that has preceded the writing of these delightful monographs in miniature.

The method of illustration also is two-fold, but both the excellent photographs of growing plants and the pen drawings are the work of Mr. Walter Beebe Wilder. The beauty of the drawings is a revelation and compares favourably with the finely drawn figures of Crispin de Pas in accuracy and delicacy of outline. We would welcome a volume of similar plates from Mr. Wilder's pen reproduced without reduction of size.

Of the photographs that of *Erythronium americanum* has unfortunately been placed upside down by the printer, and the plant described and illustrated as *Oxalis lasiantha* is *O. Deppei*. So few and slight are these blemishes that they only accentuate the charm and accuracy of this valuable book.

"Recent Advances in Cytology." By C. D. Darlington. Ed. 2. 8vo. xvi + 67 pp. (Churchill, London, 1937.) 21s.

This new edition of a work which has had an established place ever since the first edition was published in 1932 has been recast in the light of the vast amount of research that has been devoted to cytology during the past decade. Some of the conclusions discussed were alluded to in the former edition, but further work has placed them upon a firmer basis.

The author points out that cytology has three phases—the description of the cell and its contents; the description of how changes occur in cells; and the discovery of why these changes occur. These three phases are being followed simultaneously, but it is to the last of them that the author has devoted most attention. It is that phase which to a large extent gives to this book such an important place in the literature of its subject.

"A Gardener's Testament." By Gertrude Jekyll. 8vo. xiv + 258 pp. (Country Life, London, 1937.) 10s. 6d.

Many will like to have this collection of writings on garden matters from the pen of Miss Jekyll which have appeared in various periodicals and which have now been collected, arranged and edited by Francis Jekyll and G. C. Taylor.

They deal with a variety of subjects and illustrate to some extent the changes of fashion in gardening which Miss Jekyll herself did much to bring about during the forty years they cover. Miss Jekyll's knowledge and wit, and the charm and literary quality of her writing, are too well known to need further praise.

"The Family Garden." By M. James. 8vo. 296 pp. (Harrap, London, 1937.) 6s.

To the many thousands of town-dwellers to whom the pleasure of a garden, even the size of a pocket handkerchief, is denied, and who yet are not happy to live without plants, the first part (some 80 pages) of "The Family Garden" will be of real assistance. It gives lists of plants and bulbs which can be grown in a flat or in a room and in a window-box or in a miniature garden. What is more, it gives excellent advice on maintaining the plants in good health and condition, a matter of considerable difficulty in the dry air of a room and in the atmosphere of our great cities. The many and various uses to which the products of the small garden can be put are dealt with at some length in the second part of the book, and much useful information is given on such subjects as flowers for the decoration of the house, vegetables for supplying the needs of the household, and fruit for bottling and jam making. The account of what is called the cut flower garden should appeal to many readers, and there are few amateurs who would not benefit by the advice given on the packing and sending of cut flowers by post.

The book shows care in compilation, though the addition of the letter "s" to the already plural *Gladioli* making the word *Gladiolis* seems wholly unnecessary.

A useful list of plants which should be avoided in children's gardens on account of their poisonous properties is an unusual feature.

The result is a very readable book—nicely illustrated and full of information and suggestions evidently from a practised and experienced hand.

"Adam's Profession and its Conquest by Eve." By J. R. Meade. 8vo. x + 261 pp. (Longmans, Green, New York, 1936.) 8s. 6d.

Here and there in this book informal attempts at instruction in flower growing are made, and here and there more formal attempts, as where the author draws up an invoice for bulbs for spring flowering, but for the most part it is an exercise in humour at the expense of lady gardeners he has met, and of the garden clubs which flourish in America, and from membership of which Adam is excluded.

If one may judge from the book, the conquest of which the title speaks has not really occurred, for even the most expert in the neighbourhood of his home do not entirely please the author. One of them likes "red Sage," and the author does not; another is led by the acquirement of an expensive piece of statuary to remodel, not for the first time, her garden, and the author does not approve. Probably he is right, but his humour is now and then apt to be malicious.

It is, however, for its humour the book will be read, and if those concerning whom it is written can laugh at the humour, as we hope they may, the attempted conquest of Adam's profession will be more likely to be really accomplished, and Adam will feel no jealousy.

"Les Plantes Alimentaires. Vol. IV. Plantes à Boisson." By D. Bois. 8vo. 600 pp., 111 figs. (Paul Lechevalier, Paris, 1937.)

In completing Vol. IV of this work Prof. Bois has achieved the great task which he set out to do in 1927. It is no less a subject than a survey of the plants from which man, the world over, has used for drink or sustenance. It is therefore a history of man in his relation to vegetables, and this present volume, which deals with drinks, shows how deep has been the desire for something more exciting than water. Few indeed are the peoples who have not found out that any sweet juice allowed to ferment produces alcohol. Palms, cacti, sugar cane, agaves, beside the vine and pomaceous fruits, have all served as sources of intoxicating drinks.

Where alcohol was forbidden, as in the religion of Islam, the Arab found in the African coffee a cup which cheered while not inebriating. From the Camellia family came tea, now the world's most popular drink, vulgarized, a Chinaman would say, in Europe as an accompaniment of food in our teas, high or low. Tea in its native home is taken with prayer and fasting and is as much an inspiration for art and religion as wine was to the Greeks.

In the present volume, as is fit, the vine takes an important place, and the varieties used are figured and described, as are the cyder apples and perry pears.

Such information may, of course, be found elsewhere, and it will be for information in the curious by-ways of drinks that this work will be turned up most frequently.

The different varieties of palms from which wine is made will surprise the investigator; even our well-known garden friend, *Raphia Hookeri*, is pressed into service, and we read that in two months the wine becomes "très capiteux. Les noirs le beuvent que tel."

One-third of the work is devoted to non-intoxicating drinks, from the harmless lemonade to the dubious chocolate.

In all these sections we find descriptions of the species used and the mode of preparation of the beverage; we do not know of any similar work where all this information is so conveniently found.

Great care has been taken with the proof-reading, and so far we have found only one slip, where Madeira wine is said to come from Portugal. It may, of course, do so, but it obviously should not.

One cannot conclude without a tribute to the author's industry and perseverance. At an age when most men would be content to rest upon their laurels M. Bois has taken his retirement as an opportunity for extended work. Si la vieillesse pouvait? M. Bois both "knows" and "does."

E. A. BUNYARD.

"The Pests of Fruits and Hops." By A. M. Massee. 8vo. 294 pp. (Crosby Lockwood, London, 1937.) 15s.

The advent of a reliable textbook on the pests of fruit has been eagerly awaited by all interested in fruit culture. This volume, while being written primarily for the commercial grower, will provide the amateur gardener with a vast amount of information on the innumerable insect and allied pests which beset his trees and bushes and the measures to be adopted for preventing and controlling them.

The author, whose reputation as a specialist in pomological entomology is world-wide, has trodden well the path made by his predecessors, namely Miss Ormerod, whose Handbook of Insects Injurious to Orchard and Bush Fruits, published in 1898, and Prof. Theobald, whose monumental work entitled Insect Pests of Fruit, published in 1909, are models. Theobald's book has long been out of print, and, to an extent, out of date owing to the occurrence of several pests whose presence was unknown in orchards some thirty years ago. Not only have such pests as Capsid Bugs, the Fruit Tree Red Spider and the Strawberry Tarsonemid Mite become primary pests since 1909, but there have been great advances made both in the chemical (insecticidal washes and dusts) and physical (hot-water treatment of plants) methods of control, and in the machinery for applying liquid sprays and powder dusts.

The applied biologist, both entomological and mycological, has a tendency to thrust a spraying programme on to the already heavily burdened shoulders of the fruit-grower, so that the six or seven applications per annum may prove to be far in excess both from the standpoint of pest and disease control and, what is more important, from the economic standpoint.

Of the fifteen chapters, eleven deal with fruits arranged under the headings: Apple; Cherry; Red, White and Black Currants; Gooseberry; Loganberry, Blackberry, Himalaya Berry and Phenomenal Berry; Cob and Filbert Nuts, and Walnut; Peach, Apricot and Nectarine; Pear; Plum and Damson;

Raspberry ; and Strawberry ; while Chapter XII is devoted to a study of Hop Pests.

Chapter XIII discusses Beneficial and Harmless Insects, and the penultimate chapter deals with Insecticides.

The final chapter, entitled Spraying Equipment and Methods, has been written by Mr. J. Turnbull, the Ministry of Agriculture's specialist on the subject. Three indexes—Scientific, Popular and Author—complete the volume.

Arranged under each chapter heading are the more important pests of that particular fruit or group of fruits, and are as follows: 1. Beetles; 2. Moths; 3. Sawflies; 4. Flies; 5. Capsids, Greenflies, Scales, etc.; 6. Mites; 7. Snails and Slugs. Each pest is considered under a number of sectional paragraphs, namely, General Notes; Recognition in the Field; Notes on Life Cycle; and Control Measures.

There are over one hundred excellent illustrations taken from photographs by Mr. R. M. Greenslade of insect and allied pests of top and soft fruits and, in some instances, of the injury committed by them.

A limited number of references is given at the end of each pest, but the desirability of omitting several references because they are "difficult of access" or "of doubtful utility" is questionable.

Careful proof-reading has reduced the number of errors to a negligible quantity, though this reviewer is presented with two additional initials!

There is a marked absence of regard paid to the small grower and the amateur gardener which is not apparent in the works of Miss Ormerod and Theobald, and this is specially apparent in the chapter on Spraying Equipment, where no mention is made of dusting machinery or of the value of small hand-dusters for applying powders for the control of such pests as leaf-curling Aphides and Tortrix leaf-rollers. Again, the small grower will most certainly not agree with the statement (p. 281) that "In gardens, and in small orchards of 1 or 2 acres, time is not of such importance, and hand pumps must generally suffice." This statement is misleading, but it is a question of "cost" and not "time" that prevents the small grower from investing in a high-powered spraying plant.

There is no mention made in the chapter on Insecticides of the laws governing the purchase of arsenical compounds and of nicotine, nor of the danger attending the application of these washes to trees in full bloom. The value of Pyrethrum extract for applying to Gooseberry bushes and Strawberry plants against certain sawfly pests whose presence is frequently undetected until the period when the fruit is ripening requires mention, whilst the absence of information regarding the type of soft soap to be used in washes is unfortunate. It is curious to find that while the scientific name of the plant from which Derris is obtained is given, no mention is made of the botanical names of the plants from which Pyrethrum and Quassia are obtained. Carbon disulphide is dismissed summarily, though the value of this soil fumigant against Chafer larvæ and weevil grubs has been well proved.

The chapter dealing with Beneficial Insects should include in relation to fruit production the value of pollinating insects, especially hive bees, though little is said about these invaluable flower visitors and no mention is made of bees in the indexes.

The author is at fault in stating (p. 229) that the species of Tarsonemid Mite on Strawberry was not determined until 1929. The credit for the discovery of this mite should go to Mr. H. W. Abbiss, the County Horticultural Instructor for Cornwall, who sent infested plants to the reviewer in June 1924, and the mites were submitted to the late Stanley Hirst of the British Museum (Natural History), who reported (September 29, 1924) that the species was *Tarsonemus fragariae* Zimm.

This volume should be read, marked and learned by every member of the fruit-growing community, and should have a wider appeal to biologists, students and horticulturists, for the format of the book is good, the illustrations are excellent, while the subject matter is so comprehensive that this volume will remain a standard work on the pests of fruits and hops for many years to come.

G. FOX WILSON.

NOTES AND ABSTRACTS.

Allium cyaneum Regel. By C. E. Hubbard (*Bot. Mag.*, t. 9483; May 1937).—Native of Kansu where it was first found by Przewalski and later by Farrer by whom it was called *A. Purdomii*. It is a blue-flowered species with stamens longer than the perianth segments. Hardy.—F. J. C.

Campanula, A new, from Transcaucasia. By A. V. Fomin. (*Acta Inst. Bot. Acad. Sci. U.S.S.R.*, ser. 1, Flora et Syst., III; 289-91; illust.; 1936).—The author describes and figures a new species, *Campanula Kemulariae*, related to *C. Raddeana*, about 1 foot high, with heart-shaped, pointed, long-stalked, doubly-toothed basal leaves and violet flowers in a many-flowered branched inflorescence; anthers yellow, not orange as in *C. Raddeana*.—W. T. S.

Cortusa, Materials for a monograph of the genus. By A. S. Losina-Losinskaya (*Acta Inst. Bot. Acad. Sci. U.S.S.R.*, ser. 1, Flora et Syst., IV; 229-255; illust.; 1936).—The genus *Cortusa*, as represented in Asia, is usually regarded as consisting only of one species, *C. Matthioli*, but is here divided into nine (*C. Brotheri*, *C. himalaica*, *C. turkestanica*, *C. jacutica*, *C. altaica*, *C. mongolica*, *C. sibirica*, *C. sachalinensis*, *C. pekinensis*), differing chiefly in the toothing of the leaf and the form of the calyx; judging from the figures given, they are very much alike.

W. T. S.

Corydalis verticillaris DC. By W. B. Turrill (*Bot. Mag.*, t. 9486, May 1937).—A tuberous species flowering in February and March with reddish pink flowers. Introduced by Ball from Persia and found also in Iraq.—F. J. C.

Euphorbia complexa. By R. A. Dyer (*Fl. Plants S. Africa*, t. 643; Jan. 1937).—A new rather slender succulent species of *Euphorbia* from the Transvaal, allied to *E. griseola*, from which it differs in having four angles to the stem, slender discontinuous spine shields, and longer upper pair of spines. It reaches a height of about 16 inches.—F. J. C.

Euphorbia grandialata. By R. A. Dyer (*Fl. Plants S. Africa*, t. 641; Jan. 1937).—A new succulent species from the Transvaal growing 6 feet tall and having widely winged stems marked with transverse yellow bands. Flowers yellow, fruits tinged red.—F. J. C.

Euphorbia grandicornis Goebel. By R. A. Dyer (*Fl. Plants S. Africa*, t. 642; Jan. 1937).—A specimen showing the red fruits of this extremely spiny succulent *Euphorbia* is figured.—F. J. C.

Euphorbia polygona Harv. By R. A. Dyer (*Fl. Plants S. Africa*, t. 645; Jan. 1937).—This succulent *Euphorbia* with red flowers has long been known. The specimen figured bears several examples of the curious Mistletoe *Viscum minimum*, with a stem consisting of a single internode about $\frac{1}{4}$ millimetre in length with two or three scale leaves at its apex and a very congested inflorescence. The fruits of the *Viscum* are brilliant red.—F. J. C.

Euphorbias, succulent (*Fl. Plants S. Africa*, tt. 646-650; Jan. 1937).—The following species of succulent *Euphorbia* are figured and described: *E. tubigians*, *E. globosa*, *E. Frankias*, *E. galbergensis*, and *E. bupleurifolia*. *E. passa* of N. E. Brown is regarded as synonymous with *E. Woodii* published at the same time, and the latter name is retained for the species.—F. J. C.

Euphorbia tortirama. By R. A. Dyer (*Fl. Plants S. Africa*, t. 644; Jan. 1937).—A new succulent species from the Transvaal with many crowded spiny short twisted 3-angled branches from the apex of a thick root. Flowers greenish.—F. J. C.

Food Plants of the North American Indians. By E. Yanovsky (*U.S. Dept. Agr., Misc. Publ.*, 237; 83 pp.; 1936).—A list of 1,112 species of plants, belonging to 44 genera, whose use as food by the Indians of U.S.A. and Canada has been recorded during the last 80 years; 76 papers are cited. The Indians' vegetable

dietary, as shown by this compilation, is astonishingly varied: rootstocks of bracken (*Pteridium*), roasted over fire after removal of the bark, gum of fir and larch as chewing gum, spruce beer from young shoots of black spruce (*Picea mariana*), tea from roots of American larch (*Larix laricina*), seeds of many grasses, rootstocks of skunk-cabbage (*Symplocarpus foetidus*), bulbs of nearly all Liliaceae, especially of *Camassia Quamash*, acorns of oak (*Quercus*), leaves of many docks (*Rumex*), fruits of Cactaceae, Ericaceae, Rosaceae, etc., a "stupefying beverage from leaves and roots" of *Datura meteloides*, the tubers of *Sagittaria*, and so on; many species grown for ornament alone in this country are included.

W. T. S.

Gypsophila Oldhamiana Miquel. By J. R. Sealy (*Bot. Mag.*, t. 9484; May 1937).—A native of eastern China. Recently reintroduced. A perennial flowering in the second year from seed in September or October. Flowers pink in many-flowered cymes. Stems up to 30 inches high.—F. J. C.

Heuchera, A Monograph of the Genus. By C. O. Rosendahl, F. K. Butters and O. Lakel (*Minnesota Studies in Plant Science*, vol. ii, pp. 1-180; figs.; 1936).—Some members of this North-American genus are well known in gardens, though many of those grown, perhaps most of them, are hybrids, like *Heuchera brisoides*. The authors have studied all available material and distinguish fifty-one species, most of them with several varieties. Keys are given for the four sections of the genus, the species and the varieties; ample descriptions of all with their distribution and synonymy, maps and a plate of dissections of the flowers.—F. J. C.

Homeria collina Salisb. By E. Milne-Redhead (*Bot. Mag.*, t. 9487; May 1937).—Shown in 1936 as *H. Comptoni* this plant is said to be identical with *H. collina*, a native of the south-west of the Cape Province and naturalized in parts of Australia. The flowers vary from bright scarlet to creamy-white and open very rapidly. A perennial growing from a corm and needing greenhouse protection.—F. J. C.

Japanese plants illustrated [Iconographia plantarum Asiae Orientalis, II, n. 1]. By T. Nakai and others; illust.; Tokyo, 1937.—Among the ten species described and illustrated in detail are *Sedum boanense*, with underground bulbs; *Hypericum oliganthum*, a more or less procumbent species, with small yellow flowers and obovate leaves, very common in Japan; *H. senanense*, an erect, foot-high Alpine species, with flowers about $\frac{1}{2}$ inch across; *Rhododendron boninense*, endemic to the Bonin Islands; *Anaphalis viscosissima*, a gummy, evil-smelling species, 1 foot high with greenish flowers; *Cestichis plicata*, an epiphytic orchid with small yellowish-brown flowers, formerly placed in *Liparis*; *Vexillabium fissum*, another small-flowered orchid; and *Asplenium calcicola*, in general appearance somewhat like our *A. Ruta-muraria* under luxuriant conditions.

W. T. S.

Liabum ovatum Ball. By N. Y. Sandwith (*Bot. Mag.*, t. 9485; May 1937).—A plant for the alpine house from the Andes of Bolivia and Peru, with Doronicum-like flowers on short stalks.—F. J. C.

Lyonia macrocalyx Airy Shaw (*Bot. Mag.*, t. 9490; May 1937).—Formerly called *Pieris macrocalyx* this Chinese and Tibetan species has white flowers and ovate leaves glaucous beneath when young.—F. J. C.

Meconopsis, New or otherwise interesting. By George Taylor (*New Fl. & Silva*, IX; pp. 155-162; col. pl., illus.; April 1937).—Since the publication of Taylor's Account of the genus *Meconopsis* (1934) collections made by Ludlow and Sheriff and by Kingdon Ward in south-eastern Tibet have added to our knowledge of the genus by extending the known ranges of *M. villosa*, *M. paniculata*, *M. sinuata* and *M. bella*, by providing good material from the type-region of the little-known *M. argemontha* (*Primulina* series; monocarpic; up to 14 inches high, with sinuate or lobed basal leaves and usually six-petalled white flowers borne singly in the axils of the upper leaves or on basal scapes; ovary and capsule more or less densely bristly), and by bringing to light a yellow-flowered variety (var. *lutea*) of *M. horridula*, as well as a new species of potential garden merit in *M. Sherriiffii* (a polycarpic ally of *M. integrifolia*, remarkable for its "pale pinkish wine-red" flowers, borne singly on flower-stems up to 8 inches high, the generally oblanceolate, densely pubescent leaves being crowded into basal rosettes). The key in Taylor's Account is amended to account for these discoveries, while *M. Georgei* is now reduced to *M. lancifolia* as a yellow-flowered form (var. *Georgei*) and *M. Florindae* to *M. lyrata* as a yellow-flowered form (var. *Florindae*).—W. T. S.

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THE PLANT AND ITS WATER SUPPLY.—II.

By Prof. E. J. SALISBURY, D.Sc., F.R.S.

[Read March 23, 1937; Prof. F. E. WEISS, F.R.S., in the Chair.]

It must be emphasized that various chemical substances have either an inhibiting or a stimulating effect upon root development. One may cite especially the marked influence which the calcium ion appears to have in stimulating the root growth of some species (figs. 125, 126). Potassium salts not only appear to stimulate root development but also to facilitate the entry of water. A stunted root system is one of the usual symptoms of phosphate starvation in fruit trees.

The action of one plant on another has also a profound influence on root development (figs. 128, 129). In an address to the British Ecological Society in 1929, I furnished examples showing how marked an effect competition has in diminishing root growth, and stressed the considerable field for investigation in this direction (Jour. Ecol., xviii, 206, and Plate XV, 1929). Just recently some interesting quantitative data have been published by T. K. PAVLYCHENKO, which furnish striking corroboration of this conclusion. Determinations of the total length of all the roots comprising the root systems of isolated specimens of Wild Oats, of 'Marquis' Wheat and of 'Prolific' Spring Rye yielded surprisingly large figures. The entire lengths of all the roots added together were: for one plant of Wild Oats 54.3 miles, for Wheat 44.2 miles, and for Rye 50.7 miles. But when these same grasses were grown in the normal way, in drills six inches apart, so that the plants were in competition with one another, the total lengths of their root systems were reduced to between one-half and two-thirds of a mile.

When weeds were also present still further reduction was observed (*cf.* Ecology, 18, 62, 1937).

The extent to which shoot development is dependent upon that of the root is shown not only by the ancient methods adopted for producing dwarf trees but also by more carefully controlled experiments on root pruning. Such experiments have further shown that deep-seated and shallow roots are alike of importance for water supply.

It has been estimated that the average number of root hairs on the root of a garden Pea is about 230 to the sq. mm., and, despite the fact that the functional root hairs are only borne for a short distance behind the growing tip of the root and its branches, the root hairs are responsible for an increase of surface contact with the soil of approximately twelve times what it would have been in their absence: in Maize the increase of surface amounts to about five times. Recently K. WILSON, working in my laboratory, has shown that root hair production varies greatly but, as we might expect, the increase of absorbing surface consequent on root hair development, in the aquatics and marsh plants which he studied, was in most species not very large, though in *Stratiotes* it amounted to as much as nine and a half times and in the Frogbit (*Hydrocharis*) to nearly fifteen times. A practical point of some importance is that one outcome of transplantation is the almost complete destruction of the root hairs and the breaking of many of the finer roots. Therefore the plant must develop new rootlets and root hairs before the absorptive surface is restored—a process that may occupy a few days or even several weeks before the surface of absorption bears an adequate relation to the evaporating area of the foliage. Hence the desirability of diminishing the leaf surface after removal during the growing season, and the superiority of autumn transplantation over that in late winter, for whereas in autumn the soil temperature is often sufficiently above that of the air to ensure a continuation of root growth after shoot growth has ceased, in winter or early spring the air temperature is sometimes sufficiently high to stimulate bud development, although the soil is not yet warm enough to encourage root growth. Copious watering has very little remedial effect and may, indeed, by its effect on soil aeration check if it does not actually inhibit the development of the new crop of root hairs upon which further growth is dependent.

It must be emphasized that the increase of surface due to root hairs, whilst it may be of great importance for water intake during periods of drought, has perhaps a more constant value in connexion with the absorption of substances dissolved in the water, especially those in extreme dilution. The intake of the rarer metals by plants is often remarkable, having regard to their extreme sparsity and often low solubility in the soil solution. Professor NEMEČ, for instance, has recently shown that *Equisetum arvense*, that pestilential weed, may contain quite an appreciable proportion of gold in its ash, amounting to 0.0063 per cent.—not sufficient, however, either to justify its cultivation or even to compensate us for its presence. So, too, other rarer elements

can be found in appreciable amounts in many plants, and this is probably an outcome of the very large surface of contact which the root hairs provide. This increase of surface due to root hairs may well be advantageous in another direction that has not, so far as I am aware, been emphasized. Soils, as already indicated, are liable to be inadequately aerated, and the partial pressure of oxygen may easily become a limiting condition for absorption and growth. The large surface which the root hairs furnish may be very important in this connexion, enabling the plant to obtain a sufficient supply of oxygen for respiration even when the soil is water-logged. The analogy with submerged aquatic plants at once suggests itself. There, too, oxygen supply is liable to be inadequate, and there, too, the structure is such that a very large surface of contact with the surrounding water is provided.

Absorption is not, however, confined to the root system. The capacity of plants to absorb water through their leaves varies greatly according to the leaf structure of the plant ; in the same degree to which the cuticle prevents excessive evaporation from the leaf surface it will check absorption from dew and rain ; nevertheless H. F. WILLIAMS (*Jour. Elisha Mitchell Sci. Soc.*, 48, 53, 1932) found that with various species submerged leaves could adequately supply water to leaves in air on the same shoot. W. G. BRIERLEY (*Proc. Amer. Soc. Hort. Sci.*, 32, 277-283, 1934) concluded, however, that absorption from the leaves contributed in only a minor degree to the total water intake of the plant.

It has generally been assumed that the power of the wilted or partially wilted foliage to take in water from the moist air at night is entirely dependent on the degree of permeability of the cuticle. If this were so it would of necessity follow that the direct supply of water to the leaves from the air would be negligible in desert plants and other xerophytic types possessing a thick cuticle. Yet there is good reason to believe that desert plants could not exist on the meagre and very irregular precipitation that often obtains in their natural habitats. The circumstances may, I think, when the stomata are open, be very different from those usually assumed: the moisture content of the air occupying the intercellular spaces of a leaf is always approximately in equilibrium with the suction force of the cells of the mesophyll ; but, just as we find the humidity of the air above different concentrations of sulphuric acid to have corresponding saturation values, so too the air within the leaf will vary in its humidity with variations in the osmotic pressure of its cell sap. If the foliage of a plant in a non-turgid state, with, however, open stomata, be surrounded by an atmosphere of higher humidity than that of the intercellular spaces, there will be a diffusion gradient through the stomata of saturated air from outside which, being almost certainly at a higher temperature than that of the mesophyll cells, will be followed by internal dew formation upon them, so that the moisture flow will be maintained until the cells in the interior of the leaf regain their turgor. It is

significant in relation to this suggestion that some plants which are characteristic of dry habitats, such as *Opuntia versicolor*, exhibit complete closure of the stomata during the day and a partial opening at night, whilst several of our garden plants, such as the culinary Pea, the Sweet Pea, the Beet, the Sunflower, and the Turnip, tend under drought conditions to exhibit a midday closure and a nocturnal opening of the stomata. In such plants the conditions are favourable for nocturnal condensation of water vapour within the leaves under the precise conditions in which this means of replenishment of the water supply would be most advantageous.

The recovery of wilted leaves in 12 to 15 hours, recorded by W. GRUNDMANN, when warm moist air was blown on to the foliage at half-hourly intervals, was probably the result of such internal condensation. The effect of wetting leaves is clearly of practical significance, and hence considerable interest attaches to the observations of K. ARENS (Jahrb. Wiss. Bot., 80, 248-300, 1934). He found that when condensation occurs on a leaf surface the cuticle becomes permeable to salts, so that when plants are sprayed the water on the foliage becomes alkaline in a few hours. The ions passing out of the leaf are chiefly those of potassium, calcium, magnesium, and phosphorus, and in 24 hours the salt content of a leaf may in this way decrease by as much as 50 per cent. ARENS suggests that this may serve as an important means of regulating the salt content of the plant.

Nor, in our estimate of the factors determining water supply, must we overlook the competition for the available water between the different parts of the same plant. This phenomenon, which can be experimentally demonstrated, depends on the relative suctions exerted by the different regions. It has, for instance, been shown by F. DE VILLIERS that leaves may withdraw water from developing Citrus fruits, with deleterious effects upon quality (S.A. Jour. Sci., 24, 315-319, 1927), and Italian investigators have shown that the shrinkage of Olive drupes in periods of drought is due not to direct loss by the fruit so much as to indirect withdrawal of water by the leaves, and much of our summer pruning practice owes its success to the control it exercises not merely on competition for food but also on competition for water.

After the actual absorption by the roots the water ultimately passes into the conducting channels of the stem and is drawn up through these to the foliage under a tension that is probably exercised by the suction force of the cells within the leaves themselves. It would take us too far afield to discuss the various views put forward to explain either the mode of entry into the vessels or the exact method of water transport within them. It must suffice to recognize that the water is drawn up through the vessels of the wood under a tensile strain that would lead to the collapse of the vessels were these not supported by appropriate internal thickenings.

The motive force available to overcome the very considerable resistances involved is a twofold one. The continued exudation of liquid from the vessels of a cut stump, the phenomenon known as root

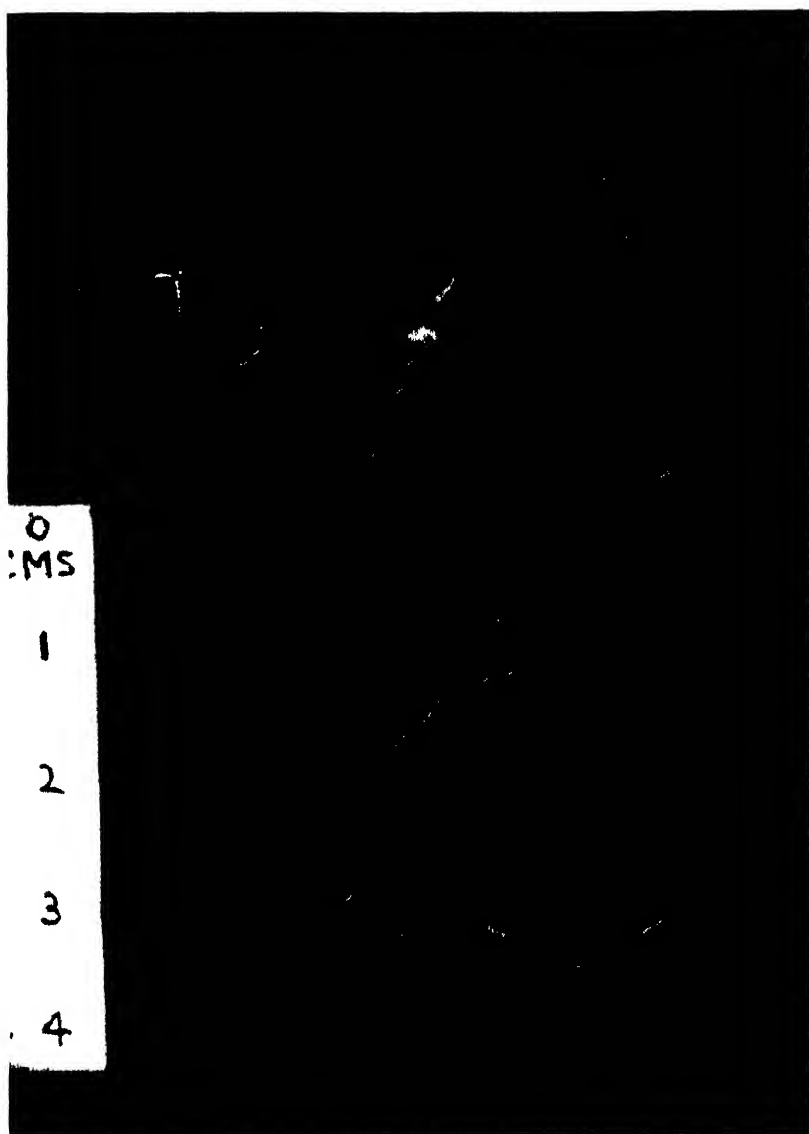


FIG. 125. EFFECT OF CALCIUM ION ON ROOT GROWTH OF *CHLORA PERFOLIATA*.

Plants on left grown in soil deficient in lime, those on right grown in same soil with CaO added.

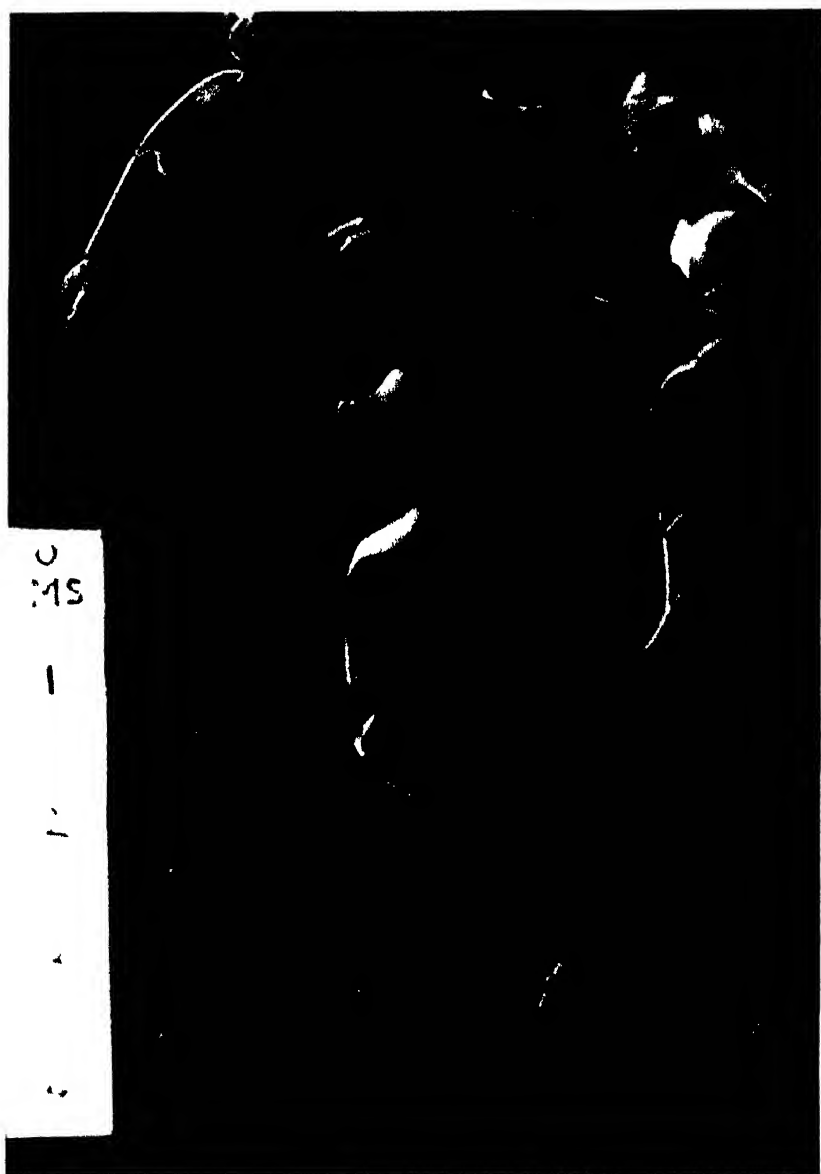


FIG 126 EFFECT OF CALCIUM ION ON ROOT GROWTH OF *HYDRICUM*
HIRSUTUM

Two plants on left grown in soil deficient in lime that on right grown in
same soil with CaO added

pressure, has been held to be due to the secretion of liquid from the living tissues of the root into the dead vessels, or to the osmotic suction of the solutes in the vessels, most probably to a combination of both factors. The magnitude of this positive pressure from below is clearly dependent on the osmotic suction which the living cells are capable of developing, and also perhaps on a spatial differentiation of permeability. It has been claimed, on rather slender evidence, that the solutes in the vessels are adequate to maintain a suction gradient, but, assuming this to be the case, we have to explain both the presence of these solutes in non-living elements and the maintenance of their requisite concentration—itself an argument for a differential permeability, other evidence in support of which is not lacking.

The other motive force is the suction exerted upon the water columns due to transpiration from the leaf surfaces. There is thus a positive pressure from below and a negative pressure from above. Whenever transpiration is active the pull is in excess of the push, so that a condition of tension in the water columns is normal, but this does not, of course, imply that the positive pressure is non-existent.

A large number of experiments have been performed to estimate the magnitude of root pressure, but the methods adopted are quite unlike the conditions in the intact plant and the conclusions drawn from them are probably fallacious. The heavy watering necessary to the methods employed results, both by direct dilution and by the indirect response of the root system—which, as URSPRUNG has demonstrated, adjusts its osmotic pressure to that of the external medium—in a marked depression of the potential suction force. In natural conditions the negative pressure due to transpiration is continually pulling the water away from the living cells of the root and thus maintaining their osmotic suction. It would, therefore, appear safe to say that, whatever the magnitude of the rôle of root pressure in the transport of water through the stem, it is probably appreciably greater than most estimates would lead us to suppose. SABININ'S indirect method, in which estimates were based on comparison of exudation from plants in water with others in very dilute solutions, yielded values which in *Xanthium strumarium* attained over two atmospheres. It may be emphasized too that the small amount of water absorbed by plants in saturated atmospheres is not, as some have asserted, evidence of the inefficiency of root pressure, but of the degree to which the mechanism of water absorption is adjusted to the external environment.

The water supply to the foliage may be compared with that to a city, the rate of flow being dependent in both on the size of the water mains and their number. Since the vessels or water pipes (fig. 130) of the plant are rarely more than half a millimetre in diameter, and are indeed usually very much less, it will be realized that they offer considerable frictional resistance to any flow through them. The viscosity diminishes with rising temperature, being halved by a rise of about 25 degrees, but frictional resistance increases in direct proportion

to the rate of flow. So on a hot day, when the plant is using water fastest, the resistance to flow is greatest.

SACHS, with the use of lithium nitrate, obtained evidence of conduction of from $\frac{1}{2}$ metre to 2 metres an hour. The actual rate of conduction has only been determined in a few instances. GROOM records a rate of about $2\frac{1}{2}$ metres an hour for the Beech and nearly $2\frac{1}{2}$ metres an hour for the Larch (Ann. Bot., 24, p. 241, 1910). FARMER calculated an average value for deciduous trees of about 20 cm. an hour. B. HUBER, making observations on the Passion Flower, recorded a rate of flow of over 31 feet (9.6 metres) in an hour; and in another climber, the White Bryony, STRASBURGER recorded 6 metres an hour. Like most climbers, Passiflora and Bryonia have relatively large vessels, but even so the frictional resistance must have been considerable.

For equivalent velocities the efficiency of vessels is proportional to the fourth power of their radii—in other words, the efficiency increases very rapidly with any increase in the diameter of the vessels, and decreases very rapidly with any diminution in their size. For instance, the largest vessels of the Vegetable Marrow are about 600 times as efficient as those of the Perennial Sunflower. It therefore follows that the foliage of a species with large vessels will for the same suction force be less liable to wilt when the air is dry and the wind high, provided there is adequate soil water, than a species with small vessels; and it is noteworthy that in general small vessels are associated with small-leaved or evergreen plants, whilst large-leaved plants frequently have large vessels. The resistance to the passage of water through the wood of the common deciduous Oak is about half that of an Evergreen Oak, whilst the deciduous Spindle Tree (*Euonymus europaeus*) has wood with about half the conducting efficiency of an Oak but some four times that of its evergreen congener *E. japonicus* (fig. 127).

We can, I think, visualize the stem as in one sense a resistance to flow interpolated between the absorbing organ and the evaporating surface. If this concept be valid it is evident that any deficiency must be greatest during day-time, when transpiration is most active and frictional resistance greatest. Evidence can in fact be adduced of the water deficit during the day-time by a shrinkage in the diameter of the stem. From observations on plants growing on the sandy foreshore in the Philippines, R. KEINHOLZ noted a decrease in diameter of the stems at midday, as compared with their diameter at night, of from 1 to 3 mm. McDOUGALL, by means of his Dendrograph, has also demonstrated the daily shrinkage of tree trunks and their nightly recovery, whilst similar changes have been observed in foliage leaves. It is not improbable that this resistance to flow may be of considerable importance to plants of dry habitats in checking the rate of water loss from the plant. If this view be correct, it may perhaps explain in part the lack of resistance to drought which may characterize plants raised under humid conditions favourable to rapid growth and the formation of large conducting tracts.

In order to transmit the pulling strain necessary to raise the water from the root to the summit of a tree it is necessary that the liquid columns in the vessel should withstand very great tensions without rupture. Much has been said and written in this connexion respecting the high cohesion of water. But some of these statements involve, I venture to think, a slight confusion of thought. If ordinary water had the high degree of cohesion which is claimed for it, one can scarcely understand the formation of air bubbles under strains of not more than 7.5 atmospheres. The movement of submerged objects would also demand much greater forces than are actually required.

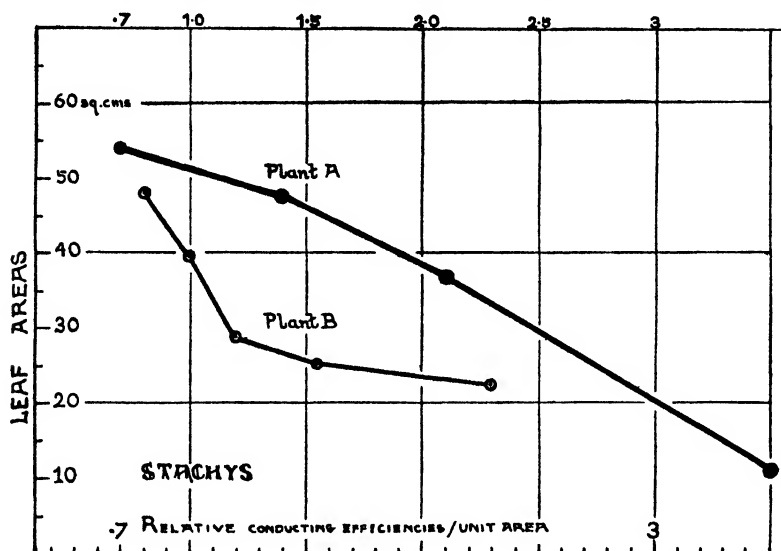


FIG. 127.—SHOWING RELATION BETWEEN CONDUCTING EFFICIENCY AND LEAF AREA IN TWO PLANTS OF *STACHYS SYLVATICA*.

As the area increases the conducting efficiency per unit area decreases. Ordinates represent leaf areas, abscissae relative conducting efficiencies.

The ingenious experiments of O. RENNER showed that the liquid in the cells of the annulus of a fern sporangium withstands a tensile strain of between 300 and 350 atmospheres, and A. URSPRUNG obtained confirmatory results. But these and other determinations purporting to demonstrate the high cohesion of water are probably indications of the great tensile strain which can be supported by the outer layer of liquid, in which the water molecules are within the sphere of influence of the containing surface. For convenience we can term this ill-defined peripheral region the "adsorption layer." It is clear that the smaller the diameter of the capillary vessels the greater the proportion of the contained liquid which is capable of withstanding high tension without rupture. Conversely, in large vessels there is a much greater proportion of liquid which for practical purposes may be considered unaffected by the attractive forces of the vessel wall, and hence the liquid in such vessels is probably less capable of withstanding such high tension. Once we appreciate the peculiar physical

properties of the "adsorption layer" in the vessels we shall realize a possible explanation as to why trees, especially in arid climates, usually have vessels of small diameter despite the high resistances such a structure involves. Perhaps we have here, too, the clue to why the woody climbers, which must perforce possess large vessels to counteract the increased resistance consequent upon their tortuous stems, are almost exclusively a feature of the humid tropical rain-forest.

If the view here adumbrated be correct, a functionally continuous layer of liquid water may be maintained in the "adsorption layer" despite high tensions that may have produced water vapour in the central region.

The view has been held by some plant physiologists that the water loss from the leaves, which we term transpiration, is merely a necessary evil, an inevitable concomitant of the facilities which the plant structure affords for the essential gaseous exchanges involved in photosynthesis and respiration. Such a view, it is true, is perhaps the outcome of a physical and chemical outlook rather than a biological one, but is doubtless in part a reaction from the earlier concept of transpiration as a sort of condensation process whereby the dissolved salts, present in the soil as a very dilute solution, were supposed to be obtained in adequate amount. It is now well recognized that the diffusion of the salts into the plant and their accumulation is independent of the amount of water intake, being determined mainly by the maintenance of the diffusion gradient from soil to plant. So long as the salts absorbed are utilized within the plant, so long will their lower internal concentration be maintained and their inward diffusion continue; but the work of STEWARD and others has demonstrated that the rate of salt intake is intimately associated with the rate of respiration, which would appear to show that the process involves vital activity and that the simple physical aspect just adumbrated is far from complete. It is the energy provided by respiration that doubtless enables inward diffusion of ions to take place against a concentration gradient. Further, it may be mentioned that there is some evidence for the existence of periods of high rate of salt intake alternating with periods of comparative rest (NIKLEWSKI, B., *et al.*: *Jahrb. Wiss. Bot.*, **69**, 101-118, 1928).

Nevertheless, though there be no direct relation between the amount of water passing through the plant and the amount of salts absorbed, HOAGLAND (*Soil Science*, **16**, 225-246, 1923) found that reduction of the rate of transpiration was accompanied by a reduction in the rate of salt intake, though the relation was not a proportional one. Moreover, it is highly probable, having regard to the slow rate of diffusion against gravity, that a rapid rate of flow in the vessels does materially facilitate the transport of salts to growing organs, especially in the case of taller plants.

Stress has been laid on the results of ash determinations of plants as indicating that transpiration plays little or no part in regulating the supply of nutrient salts. These arguments are, however, largely



FIG. 128 EFFECT OF COMPETITION ON GROWTH

Two species of *Hypericum* native on dry soil growing together. *H. pulchrum* (4 plants) on left has small roots. *H. montanum* on right has large roots (cf. fig. 129)



FIG. 129 EFFECT OF COMPETITION ON GROWTH

Two species of *Hypericum* native on wet soils growing together. The two plants with large root systems are *Hypericum undulatum*, those with much smaller roots are *H. dubium*. In the absence of competition the roots of *H. dubium* develop to an extent similar to those of *H. undulatum* (Cf. fig. 128.)

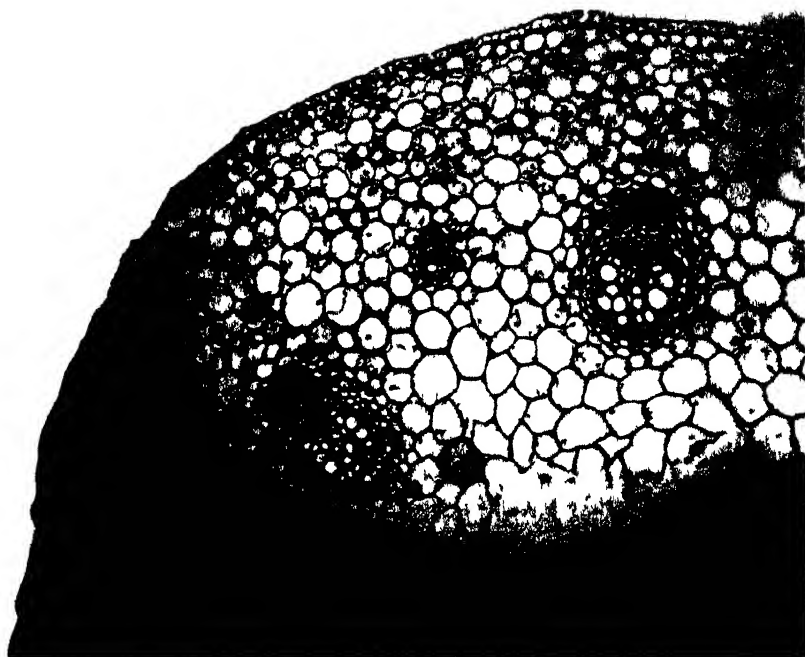


FIG. 130 TRANSVERSE SECTION OF STEM OF CREEPING BUTTERCUP
Showing the large water conducting elements in the vascular bundles



FIG. 131 TRANSVERSE SECTION OF LEAF OF LAVENDER
Showing tree like stellate hairs forming a miniature forest above the epidermis

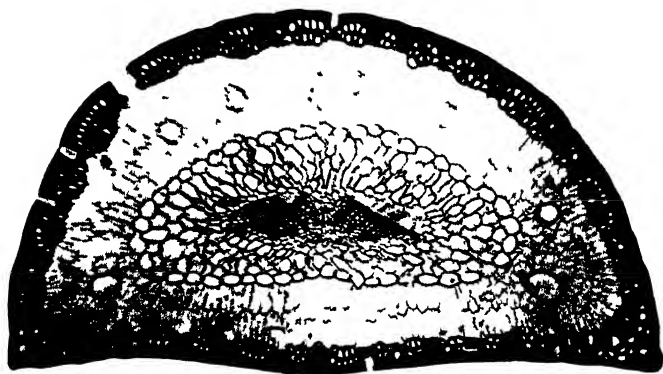


FIG. 132 TRANSVERSE SECTION ACROSS LEAF OF PINE
Showing pit like interruptions in epidermis with stomata at base
40



FIG. 133—TRANSVERSE SECTION OF LEAF OF
MARRAM GRASS (*Ammophila arenaria*)
Showing rolled position in dry air. The stomata
are at the sides of the grooves

based, I think, on a misconception. If transpiration be important for the translocation of salts, its value is concerned not with the *amount* but with the *rate* at which they are transported to the growing regions. Diffusion of salts against gravity in capillary tubes is notoriously slow, so that, in the absence of any appreciable transpiration current, the rate of growth of young organs at the top of the tree might be expected to be hindered by delay in delivery of the requisite salts, but such new substance as is formed would probably contain much the same proportion. Hence percentage ash determinations could hardly be expected to afford evidence as to the efficacy or otherwise of transpiration for the transport of solutes. The amount of salts absorbed will depend on the amount used. A rapid transpiration current, if it permit of salts being used at the more rapid rate, will be reflected in an increased rate of growth, accompanied by a corresponding increase of total ash.

Put in another way, the transpiration current tends to equalize the distribution of salts in the conducting system. If these be removed at the upper end or from any other part of the stream, more will diffuse in from the root, but if growth and consequent consumption cease, equilibrium will be undisturbed and further entry will remain in abeyance. MUENCHER'S much-quoted experiments, although performed on plants of low stature, are actually in harmony with this conception. Comparing his light and shade cultures with respective rates of transpiration of approximately 2 : 1, the total ash contents were 1.5 and 0.6 respectively, whilst with a more dilute culture solution the ratio of both transpiration and ash contents was approximately 2 : 1. The marked decrease of salt intake approximately proportioned to the decrease in transpiration is associated with a diminished consumption due to reduced photosynthesis in the shade. But increased transpiration due to lower humidity showed an approximate increase of ash of 9 per cent. It is an argument against the efficacy of diffusion alone that an increased gradient, due to more concentrated culture solutions, only had any appreciable effect on the ash content when accompanied by a markedly increased transpiration. From what has been said it is obvious that we should not expect any appreciable differences in ash content between the tops and base of a plant, though, if such differences were present, the higher values might be anticipated lower down at low rates of transpiration. The criticism expressed by CURTIS that the similarity of the ash content of tops and roots is an argument against the efficacy of the transpiration stream is clearly not valid.

The results obtained by GUSTAFSON would appear to suggest an optimum rate of transpiration characteristic of the type of plant. Thus he found that Sunflowers attained their maximum dry weight when grown in dry air, whereas Balsams attained a greater dry weight in moist air.

Apart from its probable major importance with respect to the time factor in salt transport, transpiration is also beneficial as tending to

reduce the leaf temperatures attained in sunshine. The heat absorbed in the giving off of water vapour has been found to account for a diminution of internal leaf temperature of as much as 9.5° C. But some desert plants with slow rates of transpiration have leaves that endure very high temperatures.

Water vapour escapes from the leaves mainly through the epidermal perforations. These stomata are formed by divisions of special epidermal cells, and the proportion of epidermal cells so modified is a characteristic of the species, though, like all specific characters, subject to a certain range of variation. But, as I have elsewhere shown, the number of stomata in any area of the leaf is determined by the extent of growth of the unmodified epidermal cells between the stomata. Thus, if a plant be grown in dry conditions, the leaves will remain small and the stomata will be crowded, so that their number per square inch will be large, whereas if grown in moist conditions the stomata will be widely separated by the enlarged epidermal cells, and the number of stomata per unit area will be few (figs. 110, 111). It follows that the idea at one time prevalent, that plants grown in dry conditions had fewer stomata so as to economize their water supply, entirely misrepresented the facts. The number of these pores is astonishing. Actually a square inch of the skin from the leaf of an Oak contains between one-quarter and half a million stomata, whilst a leaf of the Solomon's Seal bears about 45,000 in an equivalent area.

PLANT.	AVERAGE NUMBER OF STOMATA TO THE SQ. MM.	APPROXIMATE NUMBER TO THE SQ. INCH.
House Leek . . .	12	7,740
Lily-of-the-Valley . . .	54	34,830
Solomon's Seal . . .	66	42,570
Daphne Mezereum . . .	99	63,855
Linaria alpina . . .	97	62,565
Foxglove . . .	120	77,400
Piptanthus nepalensis . . .	166	107,070
Salix herbacea . . .	240	154,800
Berberis Darwinii . . .	368	237,360
Berberis vulgaris . . .	400	258,000
Oak (<i>Quercus Robur</i>) . . .	228-810 (av. 450)	141,900-522,450
Average for British trees	223	143,835
Average for British shrubs	199	128,355
Average for woodland herbs :		
Marginal spp. . .	145	93,525
Shade spp. . .	92	59,340

Loss of water vapour from the leaf is influenced by the same external factors that affect evaporation from a free water surface, though in slightly differing degrees. Of these external influences the saturation deficit of the air is paramount: the more humid the air the slower the rate of transpiration.

When water vapour escapes through a stoma the air around is rendered more humid, which slows down the rate of transpiration from adjacent stomata; hence in still air the closer together the stomata the more the water vapour escaping from each interferes with the escape

of that from its neighbours. The farther apart the stomata the less will be their mutual interference but the fewer their number per unit area. Hence there must be an ideal spacing of these pores which gives the greatest number per unit area consistent with the minimum of interference. Actually this ideal spacing is approximated in many leaves. We have just noted how in drier conditions the spacing becomes closer, but then the interference is less, and *vice versa*. So it is that when these pores are fully opened water vapour is lost from the leaf almost as readily as if it were a free water surface. Actually this capacity for rapid diffusion is most important to the plant in order that the carbon dioxide essential for the manufacture of food should gain rapid access to the leaf. A certain amount of water vapour can escape through the epidermis, despite the cuticularization of its outer walls: the cuticle is only partially impermeable to water vapour; hence the value of a thick cuticle to plants of dry habitats. Usually such cuticular transpiration is less than one-twentieth of that through the stomata, but, under conditions of drought such as cause the stomatal apertures to close, the absolute magnitude of this cuticular transpiration may be quite appreciable and indeed be very deleterious to the plant concerned.

It must be recognized that not only is the rate of transpiration affected by the temperature of the air but also by any difference in temperature between air and leaf. CURTIS has pointed out (Plant Phys., 11, 595, 1936) that if the leaf temperature were 5° or 10° C. above that of the air around, differences not uncommon in Nature, the result would be equivalent to the lowering of the humidity of the air by about 30 or 90 per cent. respectively. Changes in soil temperature have also been shown by CLEMENTS and MARTIN to have a marked effect, especially between 30° and 50° F., and it is perhaps in no small degree due to this that the maintenance of a good tilth in hot weather is so beneficial: the breaking of the surface, by diminishing the contact between the soil particles, results in the production of a layer which is a very poor conductor of heat, so that, though the actual surface becomes much hotter, the soil below remains cool. Chemical features also affect the rate of transpiration, as is shown by the results of SNOW, who found that alike with Sunflower, Beans and Tobacco, a deficiency in the supply of potassium was accompanied by a decrease in the rate of water loss (Plant Phys., 11, 583, 1936).

Wind is also an important factor in increasing the rate of water loss. Wind of a velocity of one mile an hour will increase the rate of water loss from the leaves of Sunflower plants by about 30 per cent., but if the velocity is increased to 16 miles an hour, the increased loss is 50 per cent. Still higher wind velocities, though they may cause high initial losses, result in a wilting which quickly lowers the rate of transpiration, so that the relation of transpiration to increasing wind velocity obeys the law of diminishing returns to a very marked degree (E. W. MARTIN and F. E. CLEMENTS, Plant Phys., 10, 613, 1935). We thus see that the actual relation between wind velocity and

transpiration departs materially from the proportionality to the square root of the velocity that has been calculated on theoretical grounds. Experiments appear to indicate that for any one species there is a wind velocity at which transpiration is greatest, but that with higher rates of air movement the water loss decreases, probably because of the resistance tension set up within the plant (M. WRENGER: *Zeitschr. f. Bot.*, 29, 257, 1935).

Hence the efficacy of wind-breaks is not only appreciable but becomes increasingly so the more it reduces wind velocity. From a practical point of view it must, however, be remembered that permeable wind-breaks are often more effective in reducing air movement than solid walls or fences, which may cause a mere temporary upward deflection of the air current.

The experiments of HAINES (*Ann. Bot.*, 42, 677, 1928; 49, 213 and 251, 1935) upon the effect of a pressure deficit have shown that the rate of water loss falls off as the difference in pressure between the air and the plant increases. HAINES obtained a reduction in the rate of water loss to only one-eighth when the pressure deficit was 100 atmospheres. It has been noted that the transpiration of leaves on a tree at a height of 12 metres was only one-sixth of that of the leaves at its base, and such observations go far to indicate that the high pressure deficits in the water tracts that have been assumed by many botanists, but questioned by others, are in fact a reality.

The amount of water utilized by plants during the production of a gramme of dry substance has been determined for a considerable number of different species by BRIGGS and SHANTZ in America, as also by other investigators elsewhere. Such data show quite conclusively that certain species are far more economical of water than others. On the same soil Apples appear to require more water than Plums, and both require a higher water content than Apricots or Walnuts. To the horticulturist this diversity of efficiency with respect to water supply is clearly of practical interest, as also is the fact that such differences are even manifested by different varieties of the same species. But it is of even greater importance that the amount of water a plant utilizes appears to increase if the volume of soil available for exploitation by its root system is diminished; thus by restricting root development we not only check growth and the amount of soil the plant can draw upon, but we also render the plant more extravagant. Several investigators have shown that the water consumption of the plant diminishes when the supply of nutriment is increased; conversely, inadequate nutrition increases the demand for water, and this may be the *modus operandi* of the influence of restricted root development on water consumption. Thus one way in which competition probably affects plants adversely is by increasing their water requirement.

Competition for water between different species or individuals, even between different parts or organs of the same plant, is, like all competition phenomena, subject to the influence of the exponential law. This fundamental concept involves the progressive augmentation of



FIG. 134 GLADIOLUS 'MOTHLR MACHREE'
(Smoky)
(p. 490)



FIG 135 —GLADIOLUS AMITTIA GALI CURCI
(Rich orange with yellow throat)

(p 491)

any initial difference in behaviour or response, and has as a consequence the continued amplification of any initial advantage. Hence any apparently insignificant initial difference may become magnified to such proportions as to produce a differentiation between individuals leading to success on the one hand and repression or death on the other. It follows that, though the actual amount of water available may not be readily controlled, the appropriate spacing and association of plants affords a practical means of adjustment that is continuously operative, whereas artificial watering is usually perforce intermittent.

It is well known that excessive water loss is a frequent cause of death of leaves, less often of entire plants, but it should be recognized that we are far from understanding why some plants endure desiccation so much better than others. Death from drying is perhaps in most instances due to irreversible coagulation of the protoplasm, whereby its ultimate structure is so far altered that re-absorption of water fails to restore its original condition. ILCIN has suggested (*Protoplasma*, 19, 414-443, 1933) that one cause of death following desiccation is that with the loss of water the living contents retract from the supporting wall. When the cell is again supplied with water the cell wall is the first part to absorb and expand, so that the volume of protoplast is even more remote from its support. When the water reaches the protoplast this expands so rapidly that, having no external support, it ruptures. By placing desiccated cells in a strong plasmolysing solution it was found possible for them to regain their turgidity unharmed. In this way cells which were subjected to the drying action of a temperature as low as minus 80° C. have recovered uninjured. Many mosses, however, will survive extreme desiccation, and are unharmed by the sudden intake of water when rain falls on them after a period of drought. We may, then, infer that intrinsic qualities of the protoplasm, as well as the structural character of the cell, are responsible for the varying resistances of species to drought injury.

It is obvious that one of the most important factors affecting the water loss from a plant is the extent of its leaf surface. The various transpiration checks which plants of dry habitats particularly exhibit are all features that either reduce the evaporation rate or permanently or temporarily reduce the evaporating surface. Thick cuticle, hairy coverings (fig. 131), crowded and tufted shoots, sunken stomata (fig. 132), etc., all have the result of reducing the rate of escape of water vapour and are most effective when the plant is subjected to rapid air movement. Many plants of dry habitats have permanently small leaf surfaces which, though reducing the expenditure, also involve a curtailment of the rate of food manufacture. It should be emphasized that the features of form and structure which tend to diminish water loss are often only of significance when there is danger of water shortage. It was found by A. BREWIG that the hairy covering of Coltsfoot leaves was only effective in reducing transpiration in wind, though hairs such as those of *Stachys lanata*, he it remarked, may appreciably diminish the heating of the leaf. By far the most effective

transpiration checks are those of a temporary character which operate automatically, such as we find in the leaves of some grasses which, as in *Elymus arenarius*, roll up so that the stoma-bearing surface is enclosed when the air is dry (fig. 133), but unroll and expose a large surface for food production when the air is sufficiently moist, so that the rate of water loss is not in excess of the rate of absorption. This beautiful automatic mechanism is accomplished by thin-walled motor cells in lines along the inner surface of the leaf, which are the first to lose water when the leaf tends to wilt and by their contraction and expansion cause the leaf to roll and unroll. When unrolled and flat the leaves of *Elymus* transpire about ten times as fast as when rolled up.

By the summer pruning of our trees and shrubs we can reduce the leaf area and thus assist to stave off the effects of a drought, but in applying this it is essential to remember that the reduction in water loss is not proportional to the reduced area, since the evaporating power of the leaves that remain is in consequence increased. Those that remain receive more water and no longer suffer from interference from those removed. Hence removal of an entire branch which is particularly exposed will be far more efficacious than removing a twig here and there.

We can usefully summarize our survey of the water relations of the plant by considering the debit and credit sides of its balance sheet of water supply.

On the credit side we have the amount of precipitation either as rain, snow, dew or mist. From this a number of deductions have to be made: some of the precipitation is supplied at an inappropriate time of the year, and as the seasonal activity of the plant varies with the species, so too does the value of a particular seasonal distribution of precipitation. Hence not only the total rainfall of an area but the time of the year in which it mostly falls will determine the suitability of that area for the cultivation of particular species. On the debatable question of the extent to which the aerial parts of plants themselves increase condensation I do not propose to dwell.

Of the rain and snow which falls, or the dew which condenses, a proportion never reaches the soil but, wetting the foliage, again evaporates into the surrounding air; the foliage is in fact a sort of umbrella over the soil, and the larger the leaf area the greater the proportion of rainfall which evaporates before reaching the soil. From the soil surface itself considerable evaporation also takes place. A further deduction must be made for the water which percolates through the soil and passes into the subsoil.

Of the water which is retained, an amount varying with the soil structure and composition, a small proportion is held too firmly to be of value to the plant. By increased root development, by production of root hairs, a greater volume of soil can be exploited, whilst by a higher osmotic suction this exploitation can be rendered more complete.

Reduced leaf surface; external and internal features of structure

tending to check transpiration ; the development of storage tissue for water, all tend to economize the supply available but do not affect its quantity.

On the debit side of the account we have the effect of temperature and wind in their influence on the saturation deficit of the surrounding air, losses due to evaporation from the soil, the resistance which the soil offers to the flow of water to the absorbing root, chemical and physical conditions of the soil adverse to absorption, of which inadequate aeration is perhaps the most important, the extent and degree of exposure of the plant, the rate of transpiration, and, finally, the competition for the water between one root system and another.

The commonest way of attempting to adjust the balance sheet is by watering. But if this is to be duly effective and adequately controlled, it is essential that we should apprehend fully the results liable to accrue. The more we water the more we shall tend to check the natural development of the root system, and as a consequence the plant will remain dependent upon the maintenance of a comparatively high moisture content in the soil. Frequent light waterings are, however, less liable to discourage extension of root growth and the development of root hairs ; there is also less risk of interfering with soil aeration than if watering be heavy. Copious waterings, if applied around rather than on the actual soil occupied, are less liable to render the plant susceptible to drought. Artificial applications of water generally result in a raising of the water content near the surface to a much higher degree than natural precipitation, and hence the plant sucks up water to an abnormal degree.

Water-pores, to which reference has already been made, serve as safety-valves when water is absorbed in excess, but it must be emphasized that, despite this immediate relief and the less immediate adjustment of osmotic suction due to internal chemical changes, the cells of the immature leaves especially undergo enlargement when there is an abrupt increase in the rate of water absorption.

The osmotic pressure of the leaf cell of many garden plants is often of the order of 8 atmospheres. If, as a result of the sudden intake of water, the linear dimensions of such cells are doubled, the resultant dilution would involve a reduction of the osmotic pressure to 1 atmosphere ; thus the suction force would be automatically reduced. But the cell walls of young leaves consist largely of cellulose which is readily extensible but also inelastic. Thus with the intake of water the cells stretch and there is an increase in volume, but, unlike many more mature cells, they do not contract to their original dimensions when the turgor pressure is released. Hence with our copious waterings the growing leaves attain to a larger area, permanently establishing a more extensive internal evaporating surface which demands for its maintenance a permanently greater water supply. Thus, whilst with increasing water content of the soil beyond an optimum the root system becomes more and more restricted, the evaporating surface of the leaves continues to augment.

The aspect then we have to realize is that by watering, especially in the juvenile phase, we not only tend to diminish water income but also to increase water expenditure, so, unless we can ensure the continued maintenance of a similar water supply, the adult individual may be disadvantageously situated as a consequence of our initial care.

Again, we can adjust the balance by checking water loss, a principle we invoke when we grow plants in sheltered spots, in the shade, or when we cover newly planted seedlings with inverted pots, but this mode of control is mainly valuable as a temporary measure to enable conditions of absorption to become adjusted to rate of loss. Spraying foliage at night serves a similar purpose of restoring a temporary loss of turgor.

We have presented the balance sheet only in its broadest outline, but though obviously so complex that it demands skilled accountancy to avoid neglecting important factors, it is evident that some of the most important of these are susceptible to horticultural control, and, though we cannot order the weather to our liking, by taking thought of these complex relations between soil and climate, if we cannot command success we can at least deserve it.

THE MODERN GLADIOLUS.

By Major G. CHURCHER, T.D.

[Read July 20, 1937; Mr. G. W. LEAK, V.M.H., in the Chair.]

THE evolution of the modern Gladiolus may be said to start with the beginning of this century. In 1901 Mr. GROFF exhibited some of his hybrids at the Pan-American Exposition; the exhibit was staged over a period of six weeks, and the varieties were of exceptional vigour, possessed a wide range of colour and had a large number of florets open at one time. His 'Peace,' 'War,' 'Blue Jay,' 'Dawn,' and 'La Luna' had a long run of popularity. British and Continental varieties also showed improvement both in form and colour.

It was in 1887 that *Gladiolus primulinus* was found in tropical Africa, and in 1902, during the construction of the railway bridge across the Zambesi, the resident engineer, Mr. S. F. TOWNSEND, sent four corms to Sir DOUGLAS FOX. These flowered on December 1 of the following year, and Sir DOUGLAS wrote for more corms to be sent to him. These he distributed by sending some to Kew and to the Botanical Gardens of Cambridge and Edinburgh. He also sent some to the leading growers at home and abroad.

By crossing with the garden varieties some hybrids were produced within three years, the first being those of KELWAY in 1908 and LEMOINE of France. Since then thousands of varieties have been raised: exquisitely beautiful flowers, of every conceivable colour and endless variation of shape, but with the characteristic hooded petal of the 'Maid of the Mist.' The earlier introductions conformed to their smaller parent, but soon the larger parent began to show itself and the seedlings were given the group name of *Primulinus grandiflorus*. Of the earlier varieties 'Alice Tiplady,' 'Ada,' 'Fire Queen,' 'Golden Girl,' 'Phyllis Kelway,' and 'Salmon Beauty' may still be found in present-day catalogues.

The term "The Modern Gladiolus" was, I think, first used by Mr. GROFF in 1910 or 1911, and in 1914 Mr. MADISON COOPER, of Calcium, N.Y., started the publication of a little monthly under the title of *The Modern Gladiolus*, which he, five years later, enlarged under the title of *The Flower Grower*.

One of the most wonderful things in Gladiolus history is the manner in which the tiny wild species, *G. primulinus*, growing less than 2 feet high, with flowers not 2 inches across, has contributed to the improvement in the modern Gladiolus in the matter of longer flower heads and vigorous foliage, as well as new forms of grace and shades of colour. Some love giants, but others prefer varieties taking more after the species in size. The smaller types, often ruffled or lacinated and varying greatly in colour, possess stems as thin as wire, and while not making much show in the border can be used for table decoration with great effect.

I have grown in my own garden, under ordinary conditions, the varieties which follow.

'Orange Glory,' an American variety of 1914, did not prove a success, notwithstanding its fine colour.

'White Glory' of 1915 has very strong petals, but the blooms on the spike are too crowded.

'Purple Glory' was a great success when it was shown in London in 1916.

1917 saw the introduction of 'American Beauty' and 'Byron L. Smith'; the latter still has a following.

In 1918 came 'Faun' and 'Nydia.' 'Nydia' was a great favourite of the late JOSEPH JACOB, and was considered by many the most beautiful up to that time.

For the years 1919 and 1920 I have nothing to mention, but during those years 'Gold' was thought to be an addition to the yellow section, and in the larger flowers were 'Mrs. Bothin,' an early salmon-rose, and the well-known 'Mrs. Leon Douglas,' 'Mrs. J. R. Walsh,' 'Sweet Lavender,' 'America,' and 'Odin.'

For 1921 I have 'Favourite,' 'Sonia,' 'Liberty,' 'Otranto,' 'Cicely' and 'Martha Washington.' Perhaps of these 'Liberty' still holds pride of place.

In 1922 Mr. BURBANK gave us 'Elora,' which is one of the earliest to flower, 'Chameleon' (BILL), 'Firecrest' (CHURCHER), 'Red Fire' (KUNDERD), and 'Sovereign' (VAUGHAN). From America in 1923 I had 'John Alden' and 'Pink Cloud.' In 1925 Mr. PFITZER gave us 'Triumph' and 'Charles Dickens.' Mr. GIBSON gave us 'Mrs. G. Killner' in 1926, and from America came 'Swiss Maiden' and 'Gladdie Boy'—always very good on a straight spike, 'Yellow Wonder,' tall with stems of wire, and 'Sunnymede,' not so tall, but with strong colour contrast.

1926. 'Martha Phillips': an example of crowded florets.

For 1927 there were 'Forest Sprite,' 'Golden Bronze' and 'Primrose Princess.' In the last, if the main spike is cut out, side shoots develop strongly. This is a feature of many of the *Primulinus* varieties, and last year it was very evident; the secondary sprays are much appreciated for table decoration. 'Mother Machree' (fig. 134) is popular with most amateurs, and 'Zona' always commands attention. 'Laciniatus' was catalogued at 1,000 dollars, but I understand none was sold at that figure, but one was disposed of the following year for half that sum. Another outstanding variety for 1927 was 'Orange Butterfly,' raised by Mr. CARL SALBACH of California. It has proved a great favourite in my home. It has received many awards both here and in other countries. 'Golden Victor' is a tall grower.

'Sandusky,' also in 1927, has florets too widely spaced.

Of the lacinated group 'Fimbriatus' and 'Aquila' appeared in 1928. I consider 'Aquila' one of the best; it is deep cream, and with me the strongest of those I have grown. 'Gay Hussar,' 'Senorita' and 'Tobersun' also belong to this year.

1929 saw many introductions. 'Mrs. Chas. A. Stevens' does not do well with me. Others of that year were 'Blue Danube' from Germany and 'Janet' from Canada. 'Janet' is a *Gladiolus* of very unusual colouring: deep peach-pink, smoked with grayed red-violet; opens four to five florets, but of medium growth.

Mr. PRESTGARD's 'Lotus' is a strong grower on a straight spike. In 1931 'Mary Elizabeth' appeared and, it was said, would prove a strong competitor of 'Lotus,' but in my garden it did not impress me. I grew it side by side with 'Lotus,' but it was not so tall and did not carry as many flowers. It may do better another year, and as it came seven to ten days later than 'Lotus' it may prove useful. 'La Argentina,' I think you will agree, is one of the brightest of the smaller flowers. It was raised by Mr. EWIN CLARK of Boston, U.S.A., who, like Mr. UNWIN, prefers the *Primulinus* varieties to the large exhibition type. Of 'Mandarin' Mr. YELD, when he saw it, exclaimed "What would we not give for an *Iris* of that colour!" As there are three 'Mandarins' to-day, it must be noted that this one was raised by Mr. PRESTGARD. The first to receive that name was raised in England, and Mr. WATKIN SAMUEL swept the board with it at one of the earlier shows at Southport. The third 'Mandarin' was sent out by the late Mr. CROW of Canada; it is somewhat like Mr. PRESTGARD's in colour, but not distinct enough. Both 'Sarah Palfrey' and 'Sunshine Girl' came from America, as also did 'Sea Foam,' a very clear white *Primulinus* which I like very much; it is earlier than 'White Butterfly' but, I fear, not such a strong grower.

1930 has been called 'Picardy's' year. 'Picardy' is a great *Gladiolus* and now at everyone's price. Among its companions were 'Pelegrina,'* 'Yellow Perfection,' 'Netherland Prince,' 'Svengali,' 'Terra-cotta,' 'Will Scarlet,' and 'Baby Decorah.'

For 1931 came 'Amelita Galli Curci' (fig. 135) from Mr. EWIN CLARK, 'Bagdad' from Mr. PALMER, and 'Rival' from Messrs. BATH. 'Netherland Prince': a gorgeous showy *Gladiolus*; tall spike; 5-inch florets—a general favourite.

'Will Scarlet': although not many flowers open at a time, is effective in a bowl.

'Bill's Fragrant' was put on the market in 1932. I like the flower, but the scent is not always to be detected. There are said to be two later scented varieties (one named 'Incense'), but I have no personal knowledge of them. 'Capt. G. M. Churcher' (fig. 136) won the Daily Mail Gold Cup for Mr. GIBSON. It is a free grower and rather early to flower. Others of this year were: 'Margaret Fulton,' one of the best of its colour and a good increaser; 'Orange King,' from British Columbia, a welcome addition to its colour class; 'Orange Sovereign,' from the same source, considered by some the better of the two; both are strong growers. Of the smaller flowers of

* Blues. Mr. COMPTON MACKENZIE, in his *Gardening Reminiscences*, says: "The blue *Gladiolus* is still as far away as it ever was, and likely to remain so. . . . Perhaps before Oxford wins the Boat Race again a genuine *Delphinium*-blue *Gladiolus* will be the portent of victory."

that year I have 'Princess Giovanna' and 'Ella May,' a dainty variety, but I doubt whether it will prove a stayer; both came from New England.

'Sweetheart,' an early variety of great charm, was introduced by Mr. PRESTGARD in 1933. 'Sweethearts,' however, come and go: the earliest of that name came in 1911, and several others appear to have had only a short existence; so you must be careful to get hold of the right one.

In 1934 there were three surprises for me in my garden, and one I named 'The Unknown.' Whether it was a sport or a seedling I cannot say, but no one at Southport or in London could give it a name. The other two were sports: one from Capt. BOYNTON, which may prove worth keeping, and the other from Dr. HOEG, a red variety which I do not think will pass muster.

'Robert Brownlee' came from a new grower who states that he has ceased to grow any of the varieties he started with ten years ago. 'Royal Pledge' (fig. 137), from the same grower, is a very bright variety which opens well on a good spike. Another PRESTGARD variety was 'Brightside' (fig. 138), which I think is well named.

'Hazel's Corsage' came into view in 1935.

At the 1936 Southport Show I was attracted by KELWAY's 'Sunshine Queen' (fig. 139) and Mr. UNWIN's 'Patricia Unwin' (fig. 140), both in the small section. For a large variety I thought Mrs. HALL's 'Abyssinia' (fig. 141) was a good example. It was in her second prize exhibit in the Foremarke Cup Competition in August, 1936.

Here are a few British varieties which have done well in my garden: 'Carlake,' a very distinct bronze-red, which looks well under artificial light; 'Goldie' and 'Joyce Adkins,' orange; 'Vivid,' bright scarlet; and 'William Copeland,' lilac-mauve.

I have noticed that during the last year or two there have been fewer varieties placed before Floral Committee A for awards; may I express the hope that those who are able to put up a vase of three or more spikes of the newer varieties will do so. I know that there is a feeling among amateurs that the judges in the Foremarke Cup Competition go only for the big fellows. Would it not be as well to restrict the competition now and again to the smaller and daintier section?

That the smaller flowers are growing in favour there is no doubt; even in Australia, the land of monsters, there are some growers who are devoting their attention to this section. Recently I was reading a report of a paper given at a meeting of the newly formed Gladiolus Society in New South Wales, in which the author gave his experiences of some of the more recent introductions. Of the Canadian he stated that 'Picardy' stood the heat well; 'Vagabond Prince' flowered from cormlets (70 per cent.), giving spikes of twelve flowers of excellent size; 'Debonair' was affected by the heat. Of the American varieties he found 'Vienna Woods' much more vigorous than 'Pelegrina'; 'Dorothy Dell' a really good orange Primulinus; 'Margaret Fulton' and 'Mildred Louise' both choice and fine growers. Of the German



FIG. 136 GLADIOLUS CAPT. G. M. CHURCHER
(Red)
(p. 491)

To face p. 492



FIG. 137. *GLADIOLUS ROYAL PRINCE*
(Red and yellow)

(p. 492)

he found 'Pelegrina' very popular but, like 'Sonatine,' it did not stand the heat well; 'J. S. Bach' best from 1-inch corms. The only English variety tested was 'Capt. G. M. Churcher,' a *Primulinus* which opens well, makes quite a long spike, and is fine in a bowl. Of Scottish, MAIR's 'Irene' and 'Jessie' seemed to please him most. He spoke well of the New Zealand 'Betty Humphries' and 'Mrs. C. P. Worley,' which might interest those who crave for giant blooms.

Mr. PFITZER when in America recently said: "Nobody will deny that the great diversity and variety of colour and of the external appearance of the modern *Gladiolus* is due in a great measure to the influence of *Gladiolus primulinus*, and this influence I think has done much to make the *Gladiolus* get rid of her former stiffness and heaviness, to make the *Gladiolus* popular and to bring together the growing community of *Gladiolus* fans in all parts of the world."

CULTIVATION.

Just a few hints on cultivation to those of you who may be thinking of growing these beautiful plants for the first time. Of course a sandy loam is ideal, but any good garden soil which is moderately rich will produce vigorous growth; but should the soil be poor, prepare the bed in the autumn, when manure may be added well below the surface and the top left rough. The ideal situation is a well-drained position away from trees or strong overgrowing plants.

The corms can be planted in rows or clumps, according to taste. If exhibition spikes are required, the corms should be at least 6 inches apart in the rows and 12 to 14 inches between the rows. Most of mine are planted in beds 4 feet wide with a 2-foot path between. The rows in the beds are 12 inches apart, and each row takes from twelve to sixteen corms. These are planted 3 to 4 inches deep on a layer of sand and charcoal; when the growth is well up, generally about the first week in June, a slight application of Clay's or other fertilizer is given between every other pair of rows, and three weeks later another application between the other rows. This method ensures very good results and avoids the possibility of an overdose. Of course the first week in June applies only to the first plantings.

If the ground has been well prepared and the beds kept hoed, there will be little need of watering, unless the weather should be dry. If water is given, see that it reaches well below the corms, and afterwards the surface should have the cultivator drawn through it. Slight waterings do more harm than good.

Lifting the corms may be done as soon as they mature, usually about a month or six weeks after flowering; do not wait till the foliage has died down, but lift at the first sign of yellowing. Cut off the tops and spread out the corms to dry in an airy place. After a week or so the old corms and roots can easily be removed and the corms stored away where the temperature is steady, between 40 and 45 degrees. During the winter the corms should be looked over and cleaned ready for planting in the spring.

STRAINS OF PERPETUAL-FLOWERING CARNATION 'PINK SPECTRUM'.

SINCE its introduction from America and its widespread commercial cultivation, the Perpetual-flowering Carnation 'Pink Spectrum' has given rise to a number of strains and it became of interest to ascertain and compare the behaviour of these strains when cultivated under identical conditions. Eighteen strains were accordingly assembled from different sources and twenty-four plants of each were grown under market-cultivation conditions, side by side, in Mr. THOMAS STEVENSON's Nurseries, Colham Green, Hillingdon.

Careful records were made of flower production over a year, and the figures are set out in the accompanying table.

The members of the Joint Perpetual-Flowering Carnation Committee met on June 24, 1937, at the Nurseries for final inspection, and the following notes embody their findings. The Committee desires to place on record its appreciation of the manner in which the trial was arranged and recorded, and of the cultivation given to the plants by Mr. STEVENSON and his son.

The sports tried and their sources were as follows :

No. 1, 'Salmon Spectrum,' sent by Messrs. Keith Luxford & Co., Sawbridgeworth ; No. 2, 'Salmon Spectrum,' sent by Messrs. Allwood Bros., Haywards Heath ; No. 12, 'Salmon Spectrum,' sent by Messrs. C. Engelmann, Ltd., Saffron Walden ; and No. 14, 'Pink Spectrum,' sent by Mr. F. G. Unwin, Hook Fruit Farm, near Basingstoke, were very similar and appear to be the original American strain of the 'Pink Spectrum' sport which bears small flowers. They all give small flowers and the stems are seldom stiff enough to hold the flowers erect. None has been at any time outstanding, though all open well even in dull weather. At the end of February they headed the cropping list, but later, with the exception of No. 1, they dropped in the production of flowers.

No. 3, 'Pink Spectrum,' sent by the Farnham Royal Nurseries, Slough (this and No. 13 were considered identical and the best strains in the trials) ; No. 7 and No. 8, 'Pink Spectrum,' selections Nos. 1 and 2, both sent by Mr. T. Stevenson, Colham Green Nurseries, Hillingdon (considered to be the second best strains in the trials) ; No. 13, 'Pink Spectrum,' sent by Messrs. C. Engelmann, Saffron Walden (with No. 3 the best strains in the trials) ; No. 15 and No. 18, 'Pink Spectrum,' sent by Messrs. G. Mount & Sons, Canterbury, and Mr. T. P. Peatling of Cranleigh, were considered to be the third best strains. The stems of all these are stiff and the flowers are always of the best. In cropping they are all near the average of the whole trial.

No. 4, 'Salmon Spectrum Improved,' sent by The Stuart Low Co., Bush Hill Park, Enfield; No. 5 and No. 6, 'Pink Spectrum,' sent by the Yeoman Nurseries, Maidstone, and by Mr. T. Stevenson, Colham

Varieties in the Trials.

No.	Name of Sport.	Number of Cuttings received.	Sender.
1	'Salmon Spectrum' .	36	Keith Luxford & Co., Sawbridge-worth, Hertfordshire.
2	'Salmon Spectrum' .	40	Allwood Bros., Clayton Nurseries.
3	'Pink Spectrum' .	36	Farnham Royal Nurseries, Slough, Bucks.
4	'Salmon Spectrum Improved' .	37	The Stuart Low Co., Bush Hill Park, Enfield, Middx.
5	'Pink Spectrum' .	37	Yeoman Nurseries, Ashford Road, near Maidstone, Kent.
6	'Pink Spectrum' .	36	T. Stevenson, Colham Green Nurseries, Hillingdon.
7	'Pink Spectrum,' No. 1 selection	36	T. Stevenson, Colham Green Nurseries, Hillingdon.
8	'Pink Spectrum,' No. 2 selection	36	T. Stevenson, Colham Green Nurseries, Hillingdon.
9	'Yellow Spectrum' .	36	Percy C. Mount, Howfield, Chartham, near Canterbury.
10	'Salmon Pink Spectrum' .	31	J. J. Passmore, East Preston Roundstone Lane Nurseries.
11	'Wivelsfield Salmon' .	40	Allwood Bros., Wivelsfield Nurseries, Haywards Heath.
12	'Salmon Spectrum' .	40	C. Engelmann, Ltd., Saffron Walden, Essex.
13	'Pink Spectrum' .	42	C. Engelmann, Ltd., Saffron Walden, Essex.
14	'Pink Spectrum' .	38	F. G. Unwin, Hook Fruit Farm, Hook, near Basingstoke.
15	'Pink Spectrum' .	48	G. Mount & Sons, The Nurseries, Canterbury.
16	'Pink Spectrum' .	52	Rolvenden Nurseries, Rolvenden, Kent.
17	'Deep Salmon Spectrum' .	25	T. Stevenson, Colham Green Nurseries, Hillingdon.
18	'Pink Spectrum' .	—	T. P. Peatling, Cranleigh, Surrey.

Green Nurseries, Hillingdon, give good flowers at times, but at other times the flowers are split and deformed. They also produce many bad buds.

No. 10 was withdrawn from the trials soon after planting. A mixed stock.

No. 11, 'Wivelsfield Salmon,' sent by Messrs. Allwood Bros., Haywards Heath. The deepest salmon-pink among the trials and always with good stiff stems, but the small flowers when fully developed are quite flat. The quality in this variety is to be found when the flowers are young.

No. 16, 'Pink Spectrum,' sent by the Rolvenden Nurseries, Rolvenden, has almost smooth-edged petals. It is a small cropper and cannot be said to be a good keeper either cut or on the plant.

No. 17, 'Deep Salmon Spectrum,' sent by Mr. T. Stevenson, Colham Green Nurseries, Hillingdon, was a mixed stock.

No. 9, 'Yellow Spectrum,' sent by Mr. P. C. Mount, Howfield, Chartham, near Canterbury. The colour—pale sulphur—has been the same throughout the year; it always opens well.

Monthly Crops of each Trial.

Trial No.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	Number of Blooms per Plant.
1	5	143	102	31	25	10	10	10	15	17	17	16.04
2	4	108	62	30	27	14	7	10	17	8	18	12.71
3	2	78*	66	34	35	15	8	25	33	27*	21	14.33
4	6	98	49	25	25	23	15	34*	34	34*	19	15.08
5	11	71	55	26	26	31	8	24	24	27	14	13.21
6	9	94	56	34	30	13	6	16	33	18*	13	13.41
7	7	64*	66	32	30	17	6	23	30	28	15*	13.25
8	10	79*	65	15	20	11	4	28*	29	42*	23*	13.58
9	31	86	29	34	8	14	11	36	33	29	19	13.75
10	6	93	62	40	20	18	13	29	38	46	29	16.83
11	5	80	64	35	29	11	8	23*	41	40	23	14.96
12	7	136	56	21	17	16	3	15	16	7	7	12.54
13	—	67*	62	37	36	23	14	29*	27	27	19*	14.21
14	11	119	52	33	31	15	4	18	19	9	10	13.38
15	1	74*	66	44	27	12	13	19	34	31*	14	13.96
16	7	57	42	18	21	32	9	17	20	19	10	10.5
17	4	72	54	43	27	16	11	22	31	27	21	13.66
18	7	74*	41	31	27	15	6	20*	27	23	10	11.71
—	7.39	88.5	58.28	31.27	25.61	17	8.66	22.11	27.83	25.5	16.77	—

* Denotes variety which was particularly good at that time.



FIG. 135 GLADIOLUS BRIGHTSIDE
(Orange)
(p. 492)



FIG 139—GLADIOLUS 'SUNSHINE QUEEN'
(Pink, with yellow throat)

(p 492)



FIG. 140 —GLADIOIUS PATRICIA UNWIN

(p 492)



FIG. 141 —GLADIOLUS ' ABYSSINIA '
(Dark red)
(p 492)

[To face p 497.

SOME NEW APPLES.

By J. M. S. POTTER, N.D.H., Fruit Trials Officer, Wisley.

'EPICURE' (figs. 83, 142).

Raised by Messrs. Laxton in 1909 at Bedford, by crossing 'Wealthy' and 'Cox's Orange Pippin.' A.M. September 1931.

Dessert: September. Flavour most pronounced at the beginning of its season.

Fruit medium, round, flat, regular. Skin pale yellow with crimson flush and stripes, smooth, rather greasy. Flesh creamy white, moderately firm, juicy, sweet, of fair flavour. Eye loosely closed, segments broad, margins convergent in small, shallow, evenly puckered basin. Stem very long, slender, in a medium even cavity. Core medium, axile, cells open. Tube long, narrow, conical; stamens medium.

Growth vigorous, upright, little spreading, compact tree.

Leaf outheld, up-folded, moderately large, oval, long, apex acute; margins unequally serrate, sometimes bi-serrate; petiole medium, moderately stout, downy; channel narrow, deep.

Shoots (winter) long, stout, very dark chocolate-brown with uneven patches of a lighter chocolate, bark rough, downy except small irregular areas which have lost down and are shiny in appearance. Lenticels many, conspicuous, large, round to oval. *Wood buds* medium to large, broad at base tapering to bluntly pointed apex, pubescent, red colour showing through downy covering. *Fruit buds* moderately small, uniform, ovate, bluntly pointed, bright red-brown colour showing below uneven covering of grey pubescence. Scales tightly wrapped.

Blossoming mid-season. *Inflorescence* five- to six-flowered, loose. *Pedicels* very long, moderately slender, pubescent, pale green tinged bronze. *Flower buds* medium, round, dark crimson. *Flowers* medium to large, well cupped then nearly flat, white with purple-pink flush, reverse side deeply flushed purple, prominently veined. *Sepals* large, three times as long as broad, acute, reflexed at tip, pubescent. *Petals* obovate with broad cordate base and rounded apex, margins little touching or free, entire, and slightly waved, upper surface concave, claw long and stout.

Stamens medium to long and moderately slender, inner erect, outer spreading, a little below level of stigmas. *Style column* very short and stout, with much pubescence at union.

Very fertile, self-fertile; has cropped heavily over several years and comes into bearing on East Malling type XII stock in the fourth year. The good flavour possessed at the beginning of September, as with most early varieties, is lost by the middle of that month.

'EXQUISITE' (figs. 84, 143).

Raised by Messrs. Laxton in 1902 at Bedford, by crossing 'Cellini Pippin' and 'Cox's Orange Pippin.' A.M. September 1926.

Dessert : September, good flavour.

Fruit medium, round-conical, irregular with occasional slight ribbing. Skin golden-yellow, with dull crimson flush and darker stripes, greasy, with little russetting. Flesh firm, crisp, creamy white, juicy, and of good distinctive flavour. Eye moderately large, usually half-open, segments broad and short, reflexed at tips, margins not touching, in a medium puckered basin. Stem short to medium, in a moderately deep russety cavity. Core medium, axile, cells open. Tube funnel-shaped, very deep, open to core, stamens medium.

Growth moderately vigorous, upright spreading.

Leaf little upheld, up-folded, medium, ovate, tapering to acute or sometimes acuminate apex ; margins mainly curved-serrate. Petiole medium, moderately slender, much downy, channel very narrow and deep. Stipules small, elliptical.

Shoots (winter) long, thin, rather "whippy," very dark brown, downy. Lenticels many, long and occasionally rather inconspicuous. *Wood buds* very small, not prominent, triangular with blunt apex, closely adpressed to shoot, reddish brown, downy. *Fruit buds* irregular, small, ovate, broadest at base gradually tapering to rounded apex. Scales well defined, tightly wrapped. Bourse rather long, slender.

Blossoming second early. *Inflorescence* usually six-flowered, but sometimes seven, erect and open. *Pedicels* medium, fairly stout, pale green, downy. Flower buds carmine with a little tinge of green. *Flowers* medium, pale pink, with prominent pink veins, reverse side heavily blotched with crimson. *Petals* cupped, not overlapping, oval, with rounded apex and slightly tapering base, margins entire and slightly waved, upper surface little concave ; claw short and stout.

Stamens medium stout, inner erect, outer spreading, anthers on same level as stigmas. *Style column* half total length of style ; column downy.

Tends to be a biennial bearer ; possesses a good brisk flavour ; in season at the end of September.

'WOOLBROOK PIPPIN' (fig. 144).

Raised by Mr. J. H. Stevens in 1903, at Woolbrook Nurseries, Sidmouth, Devon, by crossing 'Cox's Orange Pippin' and ? A.M. November 1929.

Dessert : November to December.

Fruit medium, round, flat, regular. Skin light golden-yellow with crimson flush, deep crimson stripes and uneven russet patches. Flesh creamy white, firm, crisp, juicy, of good flavour. Eye medium, open, segments rather small, broad at base, widely spaced, a little

reflexed at tips, in an even, broad, fairly deep basin. Stem long, extending beyond a fairly broad and deep russet cavity. Core medium, axile, cells closed.

Growth fairly vigorous (trees on Broad-leaved **Paradise** and Doucin stocks semi-dwarf), upright, spreading.

Leaf upheld, up-folded, medium, oval, rather long, apex acute to acuminate; petiole long, slender, downy, channel narrow; stipules small, elliptical, downy.

Shoots (winter) stout, moderately long to long, light brown with wrinkled surface downy. Lenticels small, few, rather round, inconspicuous. *Wood buds* small to medium, roundly ovate, broad at base, tapering to bluntly rounded apex, scales tightly wrapped, bright brown showing through much down. Leaf scar not very prominent. *Fruit buds* small to medium, ovate, bluntly pointed, uniform, scales well defined, closely wrapped, downy.

Blossoming mid-season. *Inflorescence* five- to six-flowered, open, becoming crowded on developing. *Pedicels* long, slender, pale green, downy. *Flower buds* small to medium, round, dark crimson. *Flowers* medium, well cupped becoming flat, white suffused pink, with prominent dark pink veins, lower surface blotched purple. *Sepals* small to medium, twice as long as broad, acute, very downy. *Petal* margins usually touching but sometimes free, ovate, with cordate base and rounded apex; margin entire, waved, upper surface little concave then flat; claw short and stout.

Stamens medium, rather slender, inner erect, outer spreading. *Style column* one-third total length, densely downy at union and for half length of free portion of styles.

Very fertile; crops heavily and regularly. In season at the same time as 'Cox's Orange Pippin,' and, while it does not possess the flavour of the latter variety, it may prove to be a useful variety where 'Cox's Orange Pippin' does not succeed.

'WOOLBROOK RUSSET' (fig. 145).

Raised by Mr. J. H. Stevens in 1903, at Woolbrook Nurseries, Sidmouth, Devon, by crossing 'Bramley's Seedling' and 'King's Acre Pippin.' **A.M.** April 1930.

Culinary: November to May.

Fruit large, slightly irregular, round, rather conical, with a broad flat base, tapering to a flattened apex, distinctly ribbed. Skin deep green, with reddish streaks over a brown flush on exposed side, inconspicuously covered with russet dots. Flesh white, firm, crisp, juicy, sub-acid. Eye large, open; segments short, broad, free, little erect, in a wide, moderately deep, unevenly ribbed basin. Stem short, downy, moderately stout, in an even, wide, rather deep russet cavity. Core small, axile, cells closed. Tube broad, funnel-shaped; stamens medium.

Acid, cooking qualities good ; small fruit make a fair dessert sample late in the season.

Growth vigorous, upright, spreading.

Leaf little upheld, little up-folded, small to medium, deep green, round, oval, apex acutely cuspidate ; margins unequally serrate, often bi-serrate ; petiole moderately long to long, stout, downy ; channel shallow, not well defined ; stipules small and narrow.

Shoots (winter) stout, long, bright deep brown with crimson tinge, downy. Lenticels few, inconspicuous, round to oval. *Wood buds* medium, dark brown, closely adpressed to shoot, ovate, broad at base tapering to rounded apex ; scales tightly wrapped, downy. *Fruit buds* rather small, bluntly ovate, longer than broad, scales tightly wrapped, dark reddish brown below with light covering of down.

Blossoming mid-season. *Inflorescence* usually seven-flowered, crowded and stiff. *Pedicels* medium, stout, downy. *Flower buds* medium, round, dark crimson. *Flowers* moderately large, well cupped then flat, white suffused pink, with prominent pink veins, lower surface blotched purple. *Sepals* moderately large, broad at base tapering to acute apex, reflexed, very downy. *Petals* little touching or apart, obovate, with broad cordate base and rounded apex. Margins entire, little waved ; claw medium, stout.

Stamens, inner erect, outer coroniform, and longer than inner. *Style column* short, stout, downy at junction and at base of free styles.

Very fertile ; has cropped heavily over several years.



FIG. 142 —ALPIT FICUS AT WISIT.



FIG 143 —APPLE EXQUISITE AT WISLEY

[To face p 501

RICHARD MILLES'S NEW KITCHEN GARDEN, 1765.

By W. ROBERTS, F.R.H.S.

No book collector will need to be warned of the danger of procrastination in the case of an enigmatic entry in a bookseller's catalogue. Few booksellers are all-round specialists, and, in pricing an unfamiliar item, they have often to be guided by the original cost. In the case of most printed books their commercial values can be ascertained from *Book Prices Current*. With manuscripts it is quite different, for there is no such guide as to values, and every written document is unique; it may have no value at all to most collectors, and yet be priceless to the specialist. In doubtful cases it is wisest to order first and risk the chances of disappointment, for hesitancy always gives a rival collector the opportunity of securing the prize—"It is naught, it is naught, saith the buyer, but when he hath gone his way then he boasteth."

In one of Mr. DOBELL'S (Tunbridge Wells) Catalogues a few months ago there was a brief entry of the MS. Inventory of a fruit garden planted in 1765 by one RICHARD MILLES, and the writer, by applying immediately, had the good luck to get it. In the case of a literary rarity possession is not always the end of a problem, but often the beginning of it. The title—if a written document can be said to have a title—is "A Catalogue of Fruit Trees planted in the New Kitchen Garden of Rich^d. Milles Esqr. in Nov^r. 1765." There was no clue whatever as to who this RICHARD MILLES was or as to where this fruit garden was situated. Whilst MILLES is not a very uncommon name, there could not have been at that time many Richards of that ilk who were men sufficiently wealthy to possess such a garden as that suggested by this MS. Inventory. Two very faint clues in the MS. each led to a *cul de sac*. "From Hadleigh" appears twice in the MS. and it was thought that the owner of the Fruit Garden may have migrated from Hadleigh to his new place and brought some of the fruit trees with him. But there were two Hadleighs, one in Essex and the other in Suffolk, and no RICHARD MILLES of note could be found to be associated with either place. Both Hadleighs have a historical background and both were subjects of JOHN CONSTABLE'S paintings. But the more important of the two was Hadleigh in Suffolk, and it is doubtless from this place that RICHARD MILLES got some of his fruit trees, possibly from a nurseryman there. A small section of the Inventory consists of 10 trees entered as "From Norw^h. in 1766." And this entry, with that of Hadleigh, seemed to indicate that RICHARD MILLES'S Fruit Garden was somewhere in the Eastern Counties.

After a good deal of research I traced a RICHARD MILLES at Elmham, a parish on the left bank of the Wensum, in Norfolk, only to find that the Hall had been demolished in quite recent times, and that the whole of the parish, nearly 5,000 acres, had passed from the SONDES family into various ownerships. A letter of inquiry to the Vicar of Elmham, the Rev. E. H. TOWNSEND, brought the encouraging reply that the Fruit Garden planted in 1765 by RICHARD MILLES was not only still in existence, but still going strong. Through the courtesy of its owner, Mrs. E. BIRKBECK, I have been permitted to visit it during the present autumn. Mrs. BIRKBECK, who now owns a portion of the estate, has built, close to the site of the old Hall, a modern residence from which there is a very fine view extending for many miles.

The Inventory enumerates considerably over 100 items, mostly divided into four sections according to the aspects of the four walls, which I may add are about 10 feet high, and are built of red bricks made on the estate not far from the Fruit Garden itself. This private brick-kiln existed down to modern times. As this Inventory is of historic interest from more than one point of view, I do not think it needs any apology for printing it in full, *verb. et lit.* The beautiful writing is evidently that of an amanuensis, and some of the spelling, here followed as closely as possible, shows that the writer was unfamiliar with the names of fruit trees, which are often written phonetically rather than conventionally; the list was probably compiled from a rough one supplied by the gardener. The corrections and additions may be in the autograph of RICHARD MILLES himself.

NORTH WALL.

No.	No.
1 Morrella cherry, dwarf.	18 Green Gage plum, Standard.
2 White hart cherry.*	19 Nirgouleause pear, Dwarf.
3 Chaumontel Pear.*	20 Black Hart cherry, Standard.
4 Ditto, standard.	21 Dr. Udell's St. Germain pear,
5 Ditto, Dwarf.	Dwarf.†
6 Ditto, Standard.	22 Wt. Start Cherry, Standard.
7 Ditto, Dwarf.	23 Dr. Udell's St. Germain pear,
8 Ditto, Standard.	Dwarf.
9 Mounsieur John pear, dwarf.	24 Stolman's Duke cherry, Standard.
10 Morella Cherry, Standard.	25 Livrede Blon pear, Dwarf.
11 Sans pippen pear, Dwarf.	26 Ox heart Cherry, Standard.
12 Duke Cherry, Standard.	27 Livrede Blon pear, Dwarf.
13 Winter Boon Cretlan, Dwarf.	28 Bonum magnum plum, Standard.
14 Duke Cherry, Standard.	29 Orleans plum, Dwarf.
15 Winter Boon Cretlan, Dwarf.	30 Bonum magnum plum, Standard.
16 Bonum magnum plum, Standard.	31 Grezan [? Crassane] pear, Dwarf.
17 Nirgouleause pear, Dwarf.	

* In Nos. 2 and 3 the original entries were respectively a Fig (name not decipherable) and a Morello Cherry, Dwarf, but these are heavily erased and the above written in in another and different autograph. Nos. 4 to 8, being in the original autograph, were probably also cherry trees. *

† Uvedale's St. Germain kitchen pear, a very old sort known in this country before 1690 (LOUDON, *Ency. of Gard.*, 1835, p. 901).

EAST WALL.

No.		No.	
32	Morocco plum, Dwarf.	59	Ditto, Dwarf.
33	Ditto, Standard.	60	Ditto, Standard.
34	Ditto, Dwarf.	61	White Flgg of Marseilles.
35	Green Damask plum, Standard.	62	Wt. Sweet water Vine.
36	Jean Hative plum, Dwarf.	63	Hanover Figg.
37	Imparatrice plum, Standard.	64	Red Hamburgh Vine.
38	Ditto, Dwarf.	65	Brown Malta Figg.
39	Fotheringham plum, Standard.	66	Blue Hamburgh Vine.
40	Ditto, Dwarf.	67	Chancellor peach, Dwarf.
41	Royal Ann peach, Standard.	68	Wt. Muscadine Vine.
42	Montauban peach, Dwarf.	69	Italian nect ^e , Dwarf.
43	Red Magdalen peach, Dwarf.	70	Royal Muscadine, Vine.
44	Catherine peach, Dwarf.	71	Violet Hative Nect ^e , Dwarf.
45	Old Newington peach, Standard.	72	Wt. Sweet water Vine.
46	Elruge Nectarin, Dwarf.	73	Bell Chevereuse peach, Dwarf.
47	Royal George peach, Standard.	74	Cathrine peach, Standard.
48	Red Roman Nect, Dwarf.	75	Old Newington peach, Dwarf.
49	Ditto, Standard.	76	Ditto, Standard.
50	Smith's early Newington peach, Stand.	77	Red Roman Nect ^e , Dwarf.
51	Old Newington peach, Dwarf.	78	Ditto, Standard.
52	Noblaas [Noblesse] peach, Standard.	79	Morella Cherry, removed from No. 3.*
53	Ditto, Dwarf.	80	Scarlet Admirable peach, Standard.
54	Montouban peach, Standard.	81	Marry Nect ^e , Dwarf.
55	French mignon peach, Dwarf.	82	Red Magdalen peach, Standard.
56	Murry Neact ^e , Standard.	83	Newington Nect ^e , Dwarf.
57	French mignon, Dwarf.	84	Green gage plum, Standard.
58	Newington Nect ^e , Standard.		

SOUTH WALL.

85	Ditto, Dwarf.	96	Orange apricot, Dwarf.
86	Duke Cherry, Standard.	97	Black Matchless plum, Stand.
87	Turkey Apricock, Dwarf.	98	Transperent apricot, Dwarf.
88	La Royal plum, Standard.	99	La Chevereuse Cherry, Stand.
89	Turkey Apricot, Dwarf.	100	Colmar Cherry, Stand.
90	Blue pendrignon plum, Stand.	101	Churchells Cherry, Stand.
91	Roman apricot, Dwarf.	102	Summer Boon Cretian pear, Dwf.
92	Azure Hative plum, Stand.	103	Bleeding Hart cherry, Stand.
93	Rein Claud [Reine Claude] plum, Stand.	104	Figg of our own, Dwarf.
94	Masculline apricot, Dwarf.	105	Carnation Cherry, Standard.
95	Matre Claud plum.	106	Buree D. Roy pear, Dwarf.
		107	Green gage plum, Standard.

SOUTH WALL NEXT THE PARK.

3	Black Frontinloe Vine.	8	Ditto.
4	Ditto.	9	Black Muscadine Vine.
5	Black cluster Vine.	10	Ditto.
6	Ditto.	11	La Marquise pear, Dwarf, remov'd.
7	Black July Vine.		

WEST WALL OUTSIDE THE GARDEN.

1	Bonsonge pear.	[In another and later hand]
2	Ditto.	Planted in Novber 1768.
3	Ditto.	South Wall next Park.
4	Turkey apricot. From Hadl.	2 Chaumontels.

* The dwarf peach originally planted here had died, and the cherry, No. 3, from the North Wall was transferred here.

PLANTED IN THE KITCHEN GARDⁿ. IN 1766.

6 Golden Pippins.	1 Ditto in the Nursery uper end of the
4 Nonparells.	Kitchen Garden against the Wall.
[From Hadleigh]	6 Cob Nuts } Upper end of
7 Figgs in Sundrys.	6 Spanish Do. } melon ground.
1 Orange Apricot in melon ground.	1 Bonrouge Pear } West side of
2 Brussells Ditto Kitch. Gard ⁿ , Stands.	1 Lamarquise Do. } ditto.
2 Turkey Ditto South Side melon	1 Bonrouge Do, Standards.
ground.	

FROM NORWⁿ. IN 1766.

1. 2 white Burle Pears.	4. 2 Cuissor Madames.
2. 2 Autumn Burgamots.	5. 2 Jargonelles.
3. 2 Doyane or Valentia.	

PLANTED IN THE KITCHEN GARDEN IN 1767.

3 Standard Bleeding Hearts [Cherrys].	3 Do. Carnations.
3 Do. Black do.	

LITTLE GARDEN BY THE DOVE HOUSE.

1 Stand ^d . White Heart.	1 Do. Flemmish.
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PLANTED IN NOVEMBER 1768.

N. Side of Melon ground	West side of the Garden :
1 Chaumontel pear.	2 Swan's Eggs.
1 Red Buree Do.	2 Medlars.
East Side of Ditto. 1 Chaumontel.	In the New Plantation :
N. Wall. 1 Chaumontel.	1 Medlar.
Espaliers to the South of the Bason :	
1 Red Buree. 1 Chaumontel.	

The divisions, North Wall, etc., were obviously loose terms implying not only the walls but the borders in their respective vicinities. Most of the varieties of fruit trees mentioned in these lists will be found recorded in RICHARD WESTON'S "English Flora, or a Catalogue of Trees, Shrubs, Plants and Fruits," London, 1775, and doubtless in similar catalogues issued at about the same time.

It would be interesting perhaps to make an inventory of the Fruit Garden as it is to-day, but that would take up too much space and serve no practical purpose. It may be stated generally that a number of the fruit trees now existing in the garden in all probability were those originally planted by RICHARD MILLES in 1765 and following years. One of the wall pears, still fruitful, extends to nearly 20 feet in breadth with about a dozen upright branches. There are several apple trees throughout the garden which are certainly coeval with its establishment, and some indeed are so old as to be hardly worth keeping, but to "scrap" these hoary lichen-covered vestiges of antiquity would be little short of vandalism. A fig tree against the South Wall has almost ceased to bear fruit, but its thick surface root extends to 5 feet in length. One or two of the vines in the lean-to vinery still bearing good crops are probably those planted by RICHARD MILLES in 1765—four years before the Hampton Court vine



FIG 144 ---APPLI WOOLBROOK PIPPIN'

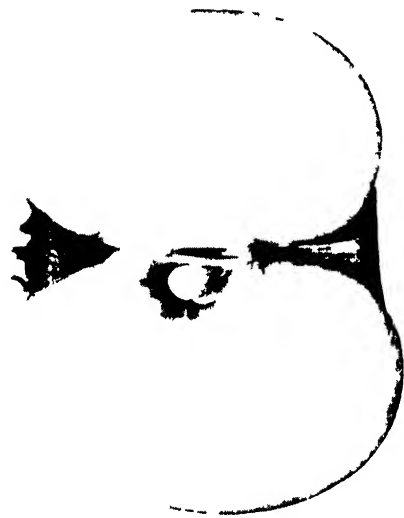
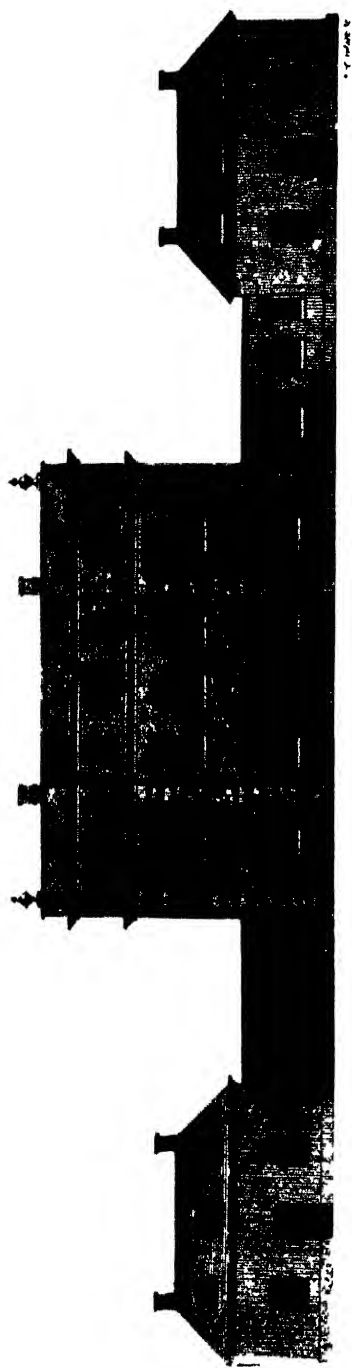


FIG 145 —APPLE WOOLBROOK RUSSSET



Scale of Feet



SEAT OF RICHARD MILES ESQ. AT NORTH ELMHAM.

FIG 146 —ELMHAM HALL, NORFOLK, 1805

To face p 505

was planted, but are confined to a much more restricted area. Some of the other vines at Elmham are of much more recent date. It may be questioned if there is in Norfolk a more extensive private Fruit Garden dating back nearly a century and three-quarters. We are still left guessing as to who actually planned the Fruit Garden and whence most of the trees were obtained. There can be very little doubt that RICHARD MILLES called in the best known authority on such matters, and probably the garden was furnished by one of the many leading nurserymen of Brompton and Fulham. I had hoped to find some mention of the place in LOUDON'S *Encyclopaedia of Gardening*, or in one of his other publications, but there does not appear to be any.

The most likely person to have been consulted by RICHARD MILLES in laying out his extensive Fruit Garden was LANCELOT BROWN (1715-83), known as "Capability Brown," who for many years was the one, and almost the only, dominating figure in laying out English gardens. He designed Kew, Blenheim and very many other places. BROWN was originally a kitchen gardener, but his fame rests rather on the pleasure gardens he designed or altered and carried out, and on the mansions of which he was the architect. It is important to note that he was employed by the famous RALPH ALLEN (1694-1764), the Squire Allworthy of FIELDING'S *Tom Jones*, in certain alterations at Prior Park, Bath, at the latter part of his career, and as, sooner or later, everybody who was anybody met at Bath, it is a fair hypothesis that BROWN and RICHARD MILLES came together in that centre of fashion and that the Fruit Garden at Elmham may have been the direct or indirect result.

Elmham, a large agricultural parish on the left bank of the Wensum, four or five miles from East Dereham, has a very ancient history. For some centuries until 1094 it was the seat of a Bishop, and the old park of his residence is still preserved. THOMAS CROMWELL, Earl of Essex (so created in 1539), the unfortunate favourite of Henry VIII, figures in the history of Elmham, and the first law case in which Sir EDWARD COKE (1552-1634) held a brief—an action for slander!—arose in Elmham. CARTEW, in *The Hundred of Launditch and Deanery of Bisley in C^o Norwich*, 1871-79, tells us that on March 27, 1762, Mrs. MILLES of Nackington showed a visitor two Roman urns which she had lately brought with her out of Norfolk where, on an estate of hers at North Elmham, they are frequently found. To this it may be added that there is an engraving of an episcopal ring, found at Elmham. The forbears and descendants of RICHARD MILLES held the estate for just two centuries. The manor, rectory, advowson and all the farms, lands and tenements, etc., in North Elmham derived from EDWARD COKE'S mortgages, were sold in 1720 to RICHARD WARNER, Esqre., for £15,000—a large sum in those days. In 1872 the rateable value of the 4,400 acres of North Elmham was £7,094. RICHARD WARNER built Elmham Hall, "an agreeable new Manor House," according to BLOMEFIELD, about 1720-40, probably on the site

of the old and smaller Manor House ; an engraving of it, with the Milles coat-of-arms, appears, with a print of the parish church, in **BLOMEFIELD'S History of Norfolk**, 1808, vol. ix. ; **WARNER** died on June 1, 1757, aged 89—there is a monument to him in the parish church. His daughter and co-heiress, **MARY** (she was born in 1712 and died in 1781), married **CHRISTOPHER MILLES**, of Nackington, Kent, and inherited the Elmham estate. Another eminent Norfolk man, **Sir EDWARD ASTLEY, Bart.**, married as his second wife, **ANN**, youngest daughter of this same **CHRISTOPHER MILLES**.

RICHARD MILLES, son of the above-named **CHRISTOPHER**, inherited Nackington, and probably his mother resided at Elmham Hall till her death. In the interval he appears to have taken in hand the management of the Norfolk estate, among other things constructing and furnishing the Fruit Garden, of which the Inventory is given above. About this time he sat to **FRANCIS COTES, R.A.**, for his portrait, a half length, in snuff-coloured coat, gold waistcoat, with a black three-cornered hat under his right arm, and a gold-tipped malacca cane. This portrait, signed and dated 1767, hung at Elmham Hall till shortly before its demolition in the early part of this century, but is no longer in the possession of his descendant, Lord **SONDES**. He married **MARY ELIZABETH**, only child of **T. TANNER, D.D.**, Prebendary of Canterbury, son of the Bishop of St. Asaph ; a companion portrait of her also hung at Elmham Hall. Both are fully described in **Prince FREDERICK DULEEP SINGH'S Portraits in Norfolk Houses**, vol. i, p. 143. **RICHARD MILLES** was M.P. for Canterbury * from 1761 to 1774, but does not seem to have taken any prominent part in politics. His only daughter and heiress, **MARY ELIZABETH**, married, Nov. 30, 1785, the Hon. **LEWIS THOMAS WATSON**, who succeeded his father in 1795 as Baron **SONDES** (she married secondly in 1809, Major-General **Sir H. T. MONTRESOR, K.C.B.**) ; **RICHARD MILLES** bequeathed the Elmham Estates to his second grandson, **GEORGE JOHN WATSON**, who took the arms and surname of **MILLES**, and who succeeded his elder brother as 4th Baron **SONDES** in 1836. It is more than probable that **RICHARD MILLES** added considerably to his Elmham estate. An Act of Parliament, 51 George III, is entitled "An Act for inclosing Lands in Gressenhall, East Bilney and Great Bittering, in the County of Norfolk" ; and the Award (partly written and partly printed, *penes me*) makes it clear that **RICHARD MILLES** came off with the lion's share, the "costs, charges and expences" amounted to "the sum of one shilling," which he was requested to pay "within Twenty Days" to **EDMUND COOPER** at East Dereham. The Award is dated July 22, 1813.

RICHARD MILLES was buried at Nackington, Kent ; there is a tablet in white marble to him near the door of the vestry in Elmham

* The long and honourable connexion of the **MILLES** family—and their allies—with Kent extended into several centuries, and will be found dealt with in **F. H. SUCKLING'S A Forgotten Past**, 1898, pp. 28–51, although some of the statements there are not always to be relied upon.

Church, and the character which he bore is alluded to in these words : " There are few who have sunk to the grave more esteemed, or whose lives have given more ample proofs of a pious or charitable disposition. To his relations and friends he has left the most useful of bequests, a bright example to go and do likewise." That this is a truthful estimation of his worth is still borne witness to by the inhabitants of Elmham. He lived in the stirring days when Napoleon I had become the terror and scourge of the world. Among the parish archives is a list of names, written upon the parchment back of an old lease, and headed " March 1798." " We, the underwritten persons, Inhabitants of the Parish of North Elmham, have subscribed the sums opposite to our respective names as a voluntary contribution in aid of the Government, and for the Defence of our Country." The first entry is " Richard Milles, Esq^r., paid into the bank, £500." This is followed by " Mrs. Milles with £10 10 od. ; Mrs. Mary Milles, £2 2 od. ; Thomas Herring, Vicar, £5 5 0 ; Richard Milles' Servants, £10 0 od." And then follow sixty-six names of parishioners. (A. G. LEGGE, *The Ancient Register of North Elmham, Norwich*, 1888.)

From the horticultural point of view RICHARD MILLES'S title to fame, or at least to notice, will be the extensive Kitchen Garden which he established in a comparatively remote corner of Norfolk. At first sight it may seem strange that so large a Kitchen Garden should be established here, for the MILLES family divided their time between Nackington in Kent and Elmham in Norfolk. It must be remembered, however, that at this period country mansions were more or less open houses to relations and friends, and that visits with retinues of servants were not for a night or two. Travelling was costly, tiring and slow, and the village inns were impossible to those who were at all accustomed to the amenities of civilization. There are innumerable pictures of those things to be found in the novels and memoirs of the eighteenth century. Whilst the larder could at all times be kept well furnished, the gardener on his part had to see that there was no lack of vegetables and fruit in variety ; his responsibilities were very great, whilst his experience and knowledge were often limited. Such a large garden as that of RICHARD MILLES at Elmham could be depended upon to meet most emergencies, and probably RICHARD MILLES, like many other owners of great country houses who entertained on the grand scale, found it easier to get visitors than to get rid of them.

THE AWARD OF GARDEN MERIT.—XLII.*

By F. J. CHITTENDEN, F.L.S., V.M.H.

226. ARTEMISIA LUDOVICIANA.

Award of Garden Merit, April 1, 1935.

All gardeners recognize the value of grey-foliaged plants on the rock garden, in the herbaceous border, on the dry wall and in the shrubbery. The contrast they afford with the normal green, and the way they can tone down harsh colour groups in the border are only two of their special uses. They have a quality of coolness and restfulness which is invaluable.

Artemisia Ludoviciana is suited for the herbaceous border. It grows to about 18 inches to 2 feet in height with unbranched grey shoots springing from the ground in close formation, clothed with grey leaves up to 2 inches long and about $\frac{3}{8}$ inch wide, sometimes toothed in the lower part of the stem, the upper entire. The flowers are borne on the upper part of the stem but are negligible. The plant is quite hardy and not particular as to soil, but it should be in the sun.

A. Ludoviciana is a native on dry banks and "pine barrens" and at times also on the prairies of Western North America. American botanists distinguish two forms, in one of which the leaves lose the grey hairs from the upper surface and become more or less green as the season advances, while in the other the grey covering is kept the season through. The latter is called *A. Ludoviciana* var. *gnaphalodes*. The plant commonly grown as *A. Ludoviciana* in this country retains its grey colouring.

227. BERBERIS CHITRIA.

Award of Garden Merit, June 30, 1924.

This Himalayan Barberry owes its chief garden value to its brilliant red fruits more or less covered with bloom, freely produced and ripening in September and October. These oblong berries nearly half an inch long hang from the stems in branching clusters often 5 inches long. They are well displayed, for the bush is a vigorous one, growing up to 10 feet in height with a spread of 12 to 15 feet, so that it should be given space to develop.

* The notes on the first hundred plants to receive the Award of Garden Merit have been collected from our JOURNAL, vols. 47 to 53, and published as a pamphlet, price 1s. For subsequent notes see vol. 54, pp. 218 and 423; 55, pp. 121 and 276; 56, pp. 80 and 245; 57, pp. 65 and 354; 58, pp. 171 and 400; 59, pp. 131, 308, 360, 406, and 449; 60, pp. 89 and 345; 61, pp. 94, 138, 225, 265, 298, 358, 393, 443, and 486; and 62, pp. 134, 416 and 450.

The leaves, which are sometimes winter green, are in groups of four or five, about $2\frac{1}{4}$ -3 inches long, spiny-tipped and sometimes spiny-toothed. The flowers, opening in June and July, are bright yellow.

B. Chitria is nearly related to *B. aristata*, from which it is distinguished by its branching inflorescence and its downy, not smooth, young branches.

It is an excellent bush where room can be given it on any soil either in the shrub border or on the lawn.

It is figured in the Botanical Magazine, t. 2549.

PLANTS TO WHICH AWARDS HAVE BEEN MADE IN 1937.

***Chrysanthemum coronarium 'Golden Crown.'** A.M. August 19, 1937. From Messrs. Hurst, London. Plant vigorous, of erect compact habit, 3 feet tall; foliage dark grey-green, feathered; flowers 2 inches across, very freely produced on 9-12-inch stems, golden-yellow, petals curled, semi-tubular.

Chrysanthemum 'Nyron.' A.M. August 31, 1937. From Messrs. Buckwell, St. Mary Cray. An attractive silvery-pink seedling producing abundant sprays of flowers useful for cutting. The florets are broad and reflexed. Raised by the exhibitors.

Cyclamen neapolitanum album. A.M. September 7, 1937. From Miss E. A. Britton, Tiverton; Dr. P. L. Giuseppi, Felixstowe; Messrs. W. E. Th. Ingwersen, East Grinstead. One of the most satisfactory autumn-flowering plants for the rock garden, where a single established plant is capable of producing hundreds of dainty white flowers. The leaves, appearing as the last flowers fade, are usually shaped more or less like the Ivy leaf, and are waved and marbled in varying degree.

Lilium pardalinum, Dimsdale's Yellow. A.M. July 6, 1937. From Miss Dimsdale, Eastleach, Lechlade. A yellow-flowered form of *L. pardalinum* raised by Mr. Robert Dimsdale, with foliage arranged as in the typical *L. pardalinum*.

Rose 'Walter Bentley.' A.M. August 31, 1937. From Messrs. Wheatcroft, Nottingham. A very vigorous-growing Hybrid Tea variety of good form, resulting from a cross between 'Dame Edith Helen' and 'Mrs. Sam McGredy.' It bears bright salmon-orange flowers having a gold reverse. They are fully double, and the petals are broad and substantial.

* After trial at Wisley.

CORNFLOWERS AT WISLEY, 1936.

ALL the Cornflowers tried were varieties of the hardy *Centaurea Cyanus*. Forty-two stocks of seed were received for trial and were sown on September 10, 1935, in rows 2 feet apart, the seedlings being subsequently thinned to 6 inches apart in the rows. The plants began to flower in the first week in June 1936, and were judged on June 26, 1936, when awards as shown below were recommended.

Flowers White.

Double White Reselected (raised and sent by Messrs. Watkins & Simpson, Drury Lane, Covent Garden, W.C.). H.C. June 26, 1936.—4 feet. Flowers $1\frac{1}{2}$ inch diameter, fully double, white.

White (raised and sent by Messrs. Bodger Seeds Ltd., El Monte, California, U.S.A.). G. June 26, 1936.—4 feet. Flowers $1\frac{1}{2}$ inch diameter, double, white.

DOUBLE WHITE (Hurst).—Contained pink-eyed rogues.

DOUBLE WHITE (Clucas).—Contained blue, carmine and pink-eyed rogues.

WHITE IMPROVED (Waller-Franklin).—Contained pale blue rogues.

Flowers Rose-pink.

Pinkie (raised and sent by the Waller-Franklin Seed Co., Guadalupe, California, U.S.A.). A.M. June 26, 1936.—3 feet. Of compact, erect habit; flowers $1\frac{1}{2}$ inch diameter, fully double, pale rose-pink. A very good, even stock.

DOUBLE ROSE (Hurst).—A mixed stock.

DOUBLE ROSE (Macdonald Seed Co.).—A mixed stock.

DOUBLE ROSE RESELECTED (Watkins & Simpson).—4 feet. Flowers $1\frac{1}{2}$ to $1\frac{3}{4}$ inch diameter, pale rose-pink.

ROSE (Bodger).—Like 'Double Rose Reselected.'

ROSEA (Benary).—Like 'Double Rose Reselected,' but contained blue rogues.

DOUBLE ROSE (Clucas, Morris).—Like 'Double Rose Reselected,' but contained carmine rogues.

Flowers of Carmine shades.

Double Carmine Rose (raised and sent by Messrs. Watkins & Simpson). H.C. June 26, 1936.—4 feet. Flowers $1\frac{1}{2}$ inch diameter, double, rich rosy-carmine. Also sent by Messrs. W. H. Simpson of Birmingham as 'Deep Rose'; this shares the award.

Ruby (raised and sent by Messrs. Bodger Seeds Ltd.). H.C. June 26, 1936.—3 feet. Of compact, erect habit; flowers $1\frac{1}{2}$ to $1\frac{3}{4}$ inch diameter, double, deep rich carmine.

CARMINEA (Benary).—Similar to 'Ruby.'

RED BOY (Waller-Franklin).—A mixed stock.

Flowers of Mauve shades.

MAUVE QUEEN (Hurst).—3½ feet. Flowers 1½ inch diameter, lavender-mauve. Contained blue and pink rogues.

DOUBLE MAUVE (Watkins & Simpson).—3½ feet. Of erect, compact habit; flowers 1½ inch diameter, bluish-mauve. A true stock.

DOUBLE MAUVE (Daniels).—Like the last. A true stock.

MAUVE IMPROVED (Waller-Franklin).—Like 'Double Mauve.'

LAVENDER (Bodger).—A variable stock of 'Double Mauve.'

Flowers of Blue shades.

JUBILEE GEM (Hurst).—12 inches. Plant of very compact habit; flowers 1½ inch diameter, double, deep cornflower blue. Contained taller-growing plants.

Double Blue Extra Select (raised and sent by Messrs. Watkins & Simpson). **A.M.** June 26, 1936.—3½ feet. Of erect, compact habit; flowers fully double, 1½ inch diameter, rich cornflower blue. A good, even stock.

Emperor William (sent by Messrs. Ernst Benary, Erfurt, Germany). **H.C.** June 26, 1936.—4 feet. Flowers 1½ to 1½ inch diameter, rich cornflower blue.

Double Blue Reselected (raised and sent by Messrs. Hurst, Houndsditch, E.C.). **C.** June 26, 1936.—4 feet. Flowers 1½ inch diameter, rich cornflower blue.

Blue Boy (raised and sent by the Waller-Franklin Seed Co.). **C.** June 26, 1936.—4 feet. Flowers 1½ to 1½ inch diameter, cornflower blue.

DOUBLE BLUE (W. H. Simpson, Clucas, Harrison of Leicester, Morris, Ohlsens Enke, Macdonald Seed Co.).—Variable stocks.

BLUE (Bodger).—A variable stock.

MARKET BLUE (Harrison of Maldstone).—Variable in shade.

ROYAL BLUE (Carters Tested Seeds).—An irregular stock with deep cornflower blue flowers.

INDIGO (Carters Tested Seeds).—A variable stock, with deep indigo flowers.

Flowers Purplish-maroon.

BLACK BOY (Waller-Franklin) { 4 feet. Flowers 1½ inch diameter, dull
MAROON (Bodger) { purplish-maroon. Messrs. Bodger's stock
 contained colour rogues.

Flowers of Mixed Colours.

DOUBLE HYBRIDS (Hurst).—Flowers 1½ inch diameter, blue, pink and white.

DOUBLE MIXED (Ohlsens Enke).—Flowers 1½ inch diameter, pale blue, blue, white and pale pink.

GARDEN NOTES.

Genista Lydia.—This plant, which received an Award of Merit when shown from Wisley in 1937, is comparatively new to gardens, but it deserves to become widely grown as a rock garden shrub. It has a fairly wide distribution in the Balkan Peninsula, extending into Hungary, Asia Minor and Syria, where it grows among boulders on steep hillsides and on the margins of woods.

It is dwarf in habit, with rather long pendulous branches, smooth, green and 5-angled. The pointed smooth linear or elliptical lanceolate leaves rather closely set are scarcely $\frac{1}{2}$ inch long. The bright yellow flowers about as long as the leaves are abundantly produced in May and June in groups of three or four at the ends of short shoots. The plant in full flower on the rock garden at Wisley this summer has survived several winters without damage in the same place. It will tolerate lime though it does not demand it, a sunny, well-drained site being its proper place.

It is botanically nearly related to *G. tinctoria*, and by some is regarded as a sub-species or race of that widespread and variable species, but for garden purposes is best looked upon as a distinct species, its name being derived from one of its habitats. It is figured under the name *G. leptophylla* in Jaub. and Spach, Illustr. t. 148.—F. J. C.

Nerium odorum.—In the spring of 1924 the late Miss ELLEN WILLMOTT sent to the Royal Hospital, Chelsea, a small plant of *Nerium odorum*. I grew the plant in a cool greenhouse, where it developed into a nice bushy plant and flowered freely, but alas, it got into a dirty condition, becoming infested with scale.

I decided on drastic measures to get the plant clean. During the early part of June 1930 I planted it outdoors, selecting a site against a wall facing west. Here the plant has established itself and has attained a height of seven feet, forming itself into a nice bushy plant. The leaves are linear, lanceolate, three in a whorl, coriaceous, with revolute edges, being seven to ten inches long, and keep evergreen throughout the winter. The most satisfactory feature of the plant is that it flowers profusely. The pale red flowers, with their agreeable musky scent, are much appreciated. I find that by pinching out the side growths the development and opening of the flower buds is materially assisted. I pen this note in the hope that other plant lovers in London may be induced to add this plant to their collection of what one may describe as belonging to a section of plants which are none too hardy.—W. Stewart, N.D.H., Royal Hospital, Chelsea.

Calypso borealis.—Having just received the accompanying letter from Mr. BARNES, I felt that readers of the JOURNAL would appreciate his lucid account of his experience with that most lovely but difficult plant *Calypso borealis*.

I am in complete agreement with Mr. BARNES that it is not a bog Orchid, for I have seen it many times and in many places, but always in half shade and mildly moist, not wet places. Why Mr. FARRER made such a statement is incomprehensible. Two of the finest stands of this plant that I ever saw were in Hatley Park, Mrs. DUNSMUIR's lovely estate on Vancouver Island, and at Jasper Park, Alberta. At Hatley Park it was growing under conifers on a steep bank and with a carpeting of damp moss. In Jasper Park it had tucked its toes under huge grey boulders, again with the mossy foundation that was damp—not wet.

For two seasons I had it and flowered it here, growing it rather as Mr. BARNES describes, but foolishly I thought I would do better and I lifted it, moss and all, and put it elsewhere. Its prompt answer was to die on me. I am going to get some roots and try the method Mr. BARNES advocates, combined with a situation as nearly approximating those where I saw it as I can achieve.

My last sight of *Calypso* was on our farewell tour of the West in 1926, when a lady sent a huge basket to greet me with at least seven or eight hundred blooms of that adorable flower tucked into moss as though they were growing. I wish they had been, for I would have nursed them carefully across the Atlantic, despite my lamentable qualities as a sailor, and I feel that to have held *Calypso* plants by the hand across that pestilent ocean might even have checked sea-sickness.

Evelyn Byng of Vimy.

Parklands,
Crescent, P.O., B.C.
April 12, 1937.

DEAR MADAM,—Herewith information on *Calypso bulbosa (borealis)*.

To transplant, cut a 2-inch cube of upland peat containing *Calypso* bulb, any time in the year. Lay cube on the surface of well-drained gravelly upland, draw Fir needles (upland peat) around cube; do *not* dig a hole, or cover with soil. Allow to dry out in summer, mulch with evergreen needles.

Calypso is not a bog Orchid. When found on a swamp, an arch of roots keeps them out of the water. They should grow easily on a seat on London Bridge; they stand heat, zero, dry in summer, rain 30 inches to 160 inches per annum, trampling, 6 feet of snow, or no snow at all—but not bog.

I have transplanted over two hundred by the above method, and I consider it the easiest native plant I know. I now have them naturalized in a semi-open wood (Douglas Fir, Hemlock, Cedar, etc.); also in my garden, I have on a steep bank, in a 3-foot radius, a patch of *Calypso*, a unique *Goodyera*, and around these, below

Primula juliae, above *Clematis paniculata*, and on either side *Androsace Laggeri*, *A. brigantia*, *A. sempervivoides*, *Douglasia laevigata*, *Primula capitata*, *Meconopsis Pratii*, *Erythronium grandiflorum*, *Silene Elisabethae*, and as weeds *Primula pulverulenta*, *Trientalis*, *Trillium*, and *Gentians*. This land has never been dug.

I have quite a patch of self-sown seedlings in a large bed of *Omphalodes verna* (never dug).

It is possible the 'Enchantress' depends on a fungus mycelium for nourishment, but if so, the fungus must be very common.

Calypso is not parasitic, as in the only station where it is found here it is under Douglas Fir alone, whereas, in the north end of Vancouver Island, Douglas Fir is entirely absent, and not a single plant constituting the ground cover is common to both stations, nor even allied, and here the climate is arid from July to middle August, whereas up north it every other day all through the summer rains and rains.

Odd plants do not get pollinated, and consequently do not spread seed, and eventually are eaten by mice, which do great destruction to this lovely flower.

Even FARRER refers to Calypso as a bog Orchid, and so perhaps you would get this information into print, and so correct this mistaken idea. Its mode of nourishment seems more arboreal than terrestrial, though I have not yet grown it this way.

Wishing yourself, and all true flower lovers over there, every success,
I remain,

Yours faithfully,
(Signed) CHAS. A. BARNES.

P.S.—It should ship anywhere in the world in August.

Interesting plants in Wisley glasshouses.—In the glasshouses at Wisley—chiefly in the larger temperate house—may be found growing a number of plants of considerable interest. They are all labelled, but a name conveys very little to those unacquainted with the plant, and such visitors quickly pass through the houses and retain no impression of what they have seen. During a recent visit I renewed acquaintance with some old friends, and those accompanying me were interested in the particulars I was able to give regarding them.

First should come what is, if not the most gorgeous of all flowering trees, certainly amongst the most brilliant half-dozen. It is *Spathodea campanulata*, a native of the Victoria Nyanza region of Africa. Europeans have named it 'Uganda Flame Tree' and its native name is 'Kifabakasi,' meaning the tree of the women. It occurs on the edges of forests and in many native gardens, and it is probably owing to the fact that the women always preserve a seedling which appears amongst the Bananas that it got its native name. It flowers in a young state and ultimately grows to about forty feet in height, with a rounded crown. Its growths, with large, handsome, pinnate leaves, are terminated by large clusters of brilliant orange-scarlet flowers, each as

large as a *Rhododendron* bloom. It is a plant of the Natural Order Bignoniaceae. The Wisley plant is vigorous, and one could wish that the size of the house permitted it to be allowed to grow without any pruning, when it might flower.

A member of the same Order, and a companion of the above in Africa used to be in the temperate house, but was missed on the last visit. It is what is now called *Markhamia platycalyx*, but which used to be named *Dolichandrone platycalyx*. Its native name is 'Lusambya' (pl. Nsambya) and has no greater significance than denoting the length and narrowness of its stems. It bears clusters of large, bright yellow flowers and is extremely ornamental. As with the *Spathodea*, natives always leave any seedlings which appear in their gardens, but, in this case, it is because of the use which is made of the poles of this tree. They are used largely for structures where durability is desired, by natives and Europeans alike. It is credited with some resistance to attacks from termites (white ants), but, although this may be true to some extent, it is not by any means immune. It is a tree of the open spaces and makes small timber.

A large plant of the 'Mountain Papaw,' *Carica candamarcensis*, bears hosts of flowers on the upper part of its trunk, but as the *Caricas* are dioecious it will not perfect any fruits. The Wisley plant is a female. This species is inferior to *C. Papaya* which produces a much larger and better eating fruit, but it is capable of enduring much lower temperatures, and is therefore grown in higher altitudes. The large, palmatifid leaves are credited with possessing the power of making tough meat tender if it is wrapped in them, and they are much used in this way by native cooks in the East; certainly a good place in which to try them out. It is a member of the Natural Order Passifloraceae and a native of Ecuador.—*E. Brown, Cranleigh.*

BOOK REVIEWS.

"Among the Meadow and Alpine Flowers of Northern Italy." By J. Armstrong Neame. 16 Coloured Plates. 8vo. 192 pp. (Mortiboy's, London, 1937.) 12s. 6d.

A pleasant book recording what the artist-author found to please him during spring and summer wanderings in Italy, mostly around towns and villages off the beaten track of flower hunters.

Both the writing and illustrating of the book evidently gave great pleasure and the reader will feel and share a soothing sense of satisfaction in the uneventful peace of these journeyings in pleasant places.

We might call it a pretty book. It is written in a rather primly conventional style suggesting old-fashioned clergymen wearing white ties.

The illustrations are planned on the lines of the little girl who said she ate butter and jam on her bread because it was economical to make the same slice do for both. Thus we find the upper portion of the plates devoted to a miniature sketch of mountain peaks, melting below into a bank of mist which serves as a background for the flowers. In most plates there are arrangements of several different kinds reduced so much below life size that accurate representation of distinguishing characters has been sacrificed to prettiness.

The most successful is that of *Cypripedium Calceolus*, in which the mountains form the background. *Atragena alpina* is allowed two-thirds of the plate and fits in pleasingly with a frieze of crags and blue sky.

A botanically-minded reader will chafe at the minute size and washy colouring of the flowers, and will be irritated by the absence of capital letters for the initials of generic names, and their use for geographical specifics as we find in *Linaria Alpina* on p. 158, and *Trollius Europaeus* on p. 54. This usage may be a fad of the publishers for which the author should not be blamed. On the other hand, ordinary readers who are fond of flowers will enjoy the pretty descriptions of scenery and peasant life and be encouraged to follow the steps of the writer.

"Dahlias." By Stanley J. Spencer. 8vo. 85 pp. (Spencer, Hockley, Essex, 1937.) Paper covers, 1s. 6d.

This is a very practical and useful little book dealing with the cultivation of the Dahlia. It is concisely written and deals with the subject from all angles. Mr. Spencer points out in the Foreword that "Soils and local conditions varying as they do, rigid instructions cannot be given within the scope of this little book," but "with the necessary modifications at the discretion of the individual, the directions will, it is hoped, prove adequate to the needs of the veriest beginner."

Among the many chapters special consideration is given to choosing and preparing the site; mulching, lifting and storing; propagation and growing on; showing; choosing types and their classification; diseases and pests; and the origin of the Dahlia. There are few blemishes: on p. 35 "Farenheit" instead of "Fahrenheit" occurs. The little work can be highly commended.

D. B. CRANE.

"Pests of Ornamental Garden Plants." By G. Fox Wilson, N.D.H., F.L.S. Bull. 97. Ministry of Agriculture. 8vo. v + 128 pp. (H.M. Stationery Office, London, 1937.) 3s. 6d.

This very useful and practical book, prepared by the Royal Horticultural Society's Entomologist, deals with the insect and similar pests of ornamental plants. It gives descriptions of the damage done and of the agents bringing it about, with appropriate measures for their control, such as can be applied in the garden.

The arrangement of the book is such that the pests of any particular ornamental plant can readily be found.

The early pages, dealing generally with measures of control, are particularly valuable, and the Preface contains an earnest appeal to every grower to restrict as far as possible the pests which occur, lest they invade the gardens of one's neighbours.

"Crop Production in Frames." Bull. 65. Ministry of Agriculture. Ed. 2. 8vo. vi + 74 pp. (H.M. Stationery Office, London, 1937.) 1s. 6d.

A new edition of this very useful Bulletin bringing the information and recommendations as to varieties up to date. The imposition of import duties (which are listed in Appendix II) has given an impetus to the cultivation of this type of crop which has had a very beneficial effect.

"Municipal Parks: Layout, Management and Administration: together with a Short Treatise on the Organisation of a Public Parks Department." By W. W. Pettigrew, V.M.H. 8vo. xvi + 279 pp. (Jour. Park Administration, London, 1937). 21s.

In this comprehensive book is embodied the experience of one who held the office of Park Superintendent for the long period of forty-five years. The author, Mr. W. W. Pettigrew, late General Superintendent of the Manchester Parks, states in the Preface that it is thirty years since he first thought of writing such a book.

In the interim, no one else has attempted to deal with the subject of Park Administration. One can therefore rightly assume that only a person with wide practical experience and ability to place the facts in their true perspective could successfully carry out such a task.

In the twenty-seven chapters of this book Mr. Pettigrew has placed before us a vast amount of information in the thorough and lucid manner which we have learnt to expect from him. Not only has he given us of his experience in full measure, but much sound advice is found throughout the book.

Beginning with the acquisition of land for a large park, we are taken through the various stages of its layout, making and equipment. Here is explained how to prepare and report on the layout, the construction of roads and paths, the construction and equipment of bowling greens, tennis courts, sports grounds, bandstands and the other characteristic features of a large public park.

In each case, estimates are given of the cost of labour and materials. Not only does the author give many hints on how to carry out the work, but he is also careful to point out where mistakes are likely to occur. A chapter is devoted to bye-laws and their application, followed by others on the control of playing fields, revenue-producing games and musical performances.

An important section is that which deals with the personnel of the office and outside staffs, the allocation of duties and office routine.

In the chapter headed "The Parks Superintendent" the author defines the ideal which should be aimed at and gives wise counsel as to the relations which should exist between the Superintendent and his committee and also between the Superintendent and his staff.

There is an Appendix of forty-eight pages containing specimen wages sheets, time sheets, and the periodical returns necessary for the efficient working of a large Parks department. These can be adapted to suit the needs of most Local Authorities. The book is dedicated to the late Mr. Andrew Pettigrew of Cardiff, and was written mainly for the benefit of the young men of the profession, but it will be welcomed by Superintendents generally, as a valuable book of reference. It will remain the standard work on Public Parks for many years to come.

J. CHRISTIE.

NOTES AND ABSTRACTS.

Aster, the correct Name of the yellow hybrid. By M. L. Green (Kew Bull., pp. 350-352; 1937).—The plant variously known as *Aster hybridus luteus*, *Solidaster hybridus*, and *Asterago lutea*, should be properly called *Solidaster luteus* (Everett) M. L. Green. It is a bigeneric hybrid, between *Aster plarimicoides* and an unknown species of *Solidago*, whose history has been detailed in Gard. Chron. ci., p. 6 (1937), where there is also a figure of a dried specimen.—B. O. M.

Chasmanthe cafra (Baker) N. E. Brown. By E. Milne-Redhead (*Bot. Mag.*, t. 9470; Feb. 1937).—A bulbous herb recently introduced from south-eastern Cape Province and Natal, with chiefly radical lanceolate-linear leaves up to 14 inches long and showy erect spikes 8 to 12 inches long of twelve to twenty irregular scarlet flowers. A plant for the cool greenhouse, easily propagated by seed and corms.—M. S.

Colletia species, Notes on. By J. R. Sealy (Kew Bull., pp. 325-333; 1937).—The description of the species previously known as *C. spinosa* Lam. (1797) is stated to have been drawn up from two distinct specimens on the same herbarium sheet which were separated by Miers in 1860 as *C. spinosa* and *C. aciculata* respectively, the former from Buenos Ayres, the latter from Peru. The earliest name, however, which has been applied to *C. spinosa* is *C. spinosissima* Gmelin (1791), which therefore takes precedence, the former being rejected as a "nomen illegitimum."

A new form, *subglabra*, is described for *C. armata*.—B. O. M.

Corylus Columna Linn. By R. Melville (*Bot. Mag.*, t. 9469; Feb. 1937).—This is the Constantinople Hazel, an arborescent form from Southern Hungary southwards in Eastern Europe extending through Asia Minor to Transcaspiä, distinguished from other species and hybrids by the absence of a tuft of hairs on the tips of the anthers, and by the approximately sixteen simple or sometimes bifurcate segments of the cupule two to two and a half times the length of the nut, slightly swollen at the base, with numerous gland-tipped setae. A tree up to 80 feet in height, propagated easily by seed or suckers, and requiring protection only when young.—M. S.

Freesia and its History. By Dr. N. E. Brown, A.L.S. (*Jour. S. Afr. Bot.*, i. 1-31; Jan. 1935).—A comprehensive account of the nineteen species and two varieties recognized in this entirely South African genus, accompanied by a key for specific identification, and for each species a description, references, synonymy, and a list of examined specimens with their localities. *Ixia caryophyllacea* Burmann is recognized as *Freessia caryophyllacea* N.E.Br. *F. Armstrongi* Watson is noted as the sole example in the race with pink flowers and the origin of many garden hybrids. *F. picta* N.E.Br. is said to be probably the most handsome, having flowers two or even more inches long, cream and yellow in colouring. *F. Leichlinii* Klatt is reduced to a variety of *F. xanthospila* Klatt; it has also been known in the past as *F. refracta Leichlinii*, and was found in the Botanic Garden at Padua by Max Leichtlin in 1873. There is a long account of the origin and history of *F. laticea* Fenzl ex Klatt (*F. alba* Foster; *F. refracta alba* Klatt). *F. Sparrmannii flava* N.E.Br., with clear yellow flowers, is raised to specific rank as *F. flava* N.E.Br., while *F. rubella* Baker is referred to *Watsonia*. This monograph is concluded by a brief list of the older hybrids.—B. O. M.

Galanthus ikariae Baker. By W. B. Turrill (*Bot. Mag.*, t. 9474; Feb. 1937).—A late-flowering Snowdrop from the island of Ikaria, in the Eastern Aegean, differing from *G. Alleni* Baker in its longer and more acuminate, sharply mucronate anthers, and its bright green leaves. Flowers large, with a green bilobed blotch on the apex of the inner tepals.—M. S.

Grindelia obliuensis (Cornellissen) Cabrera. By N. Y. Sandwith (*Bot. Mag.*, t. 9471; Feb. 1937).—A shrubby perennial Composite, up to 2 feet in height, native in Argentina from San Juan to the Gobernación de Santa Cruz; the leaves are variable from narrowly oblanceolate to obovate, and from dentate or pinnatifid to entire; the flower heads, up to 2½ inches diameter, are entire. The plant is not entirely hardy in England.—M. S.

Mertensia in North America, A monograph of the. By L. O. Williams (*Ann. Miss. Bot. Gard.*, xxiv, pp. 17-159; illust.; 1937).—The genus *Mertensia* contains many species of potential garden merit and reaches its greatest complexity in the Rocky Mountains and Western North America, particularly in the western half of Colorado. Most of the species are mountain plants. In the present paper 24 species, with numerous varieties, are distinguished and described in detail and many of them figured. *M. pulchella* and *M. Horneri* are synonymous with *M. longiflora*, the earliest name, and *M. pratensis* with *M. franciscana*.

W. T. S.

Nierembergia caerulea Gillies. By J. R. Sealy (*Bot. Mag.*, t. 9473; Feb. 1937).—A compact perennial from Cordoba, Argentina, up to 1 foot high, with small linear leaves and cymes of flowers with very narrow long tubes, and widely spreading corolla limbs up to 1 inch in diameter, deep bluish-violet within, paler without. Apparently hardy and easy to grow as an annual or perennial on the border or rock garden. It has been erroneously distributed as *N. hippomanica*, from which it differs in its larger size, its longer leaves, and its violet, not rose, flowers.—M. S.

Paphiopedilum Wardii. By V. S. Summerhayes (*Bot. Mag.*, t. 9481; May 1937).—Native of N. Burma where it was found by Capt. K. Ward. Requires a warm house. It differs from *P. superbians* by the purplish under surface of the leaves, the smaller flowers, the narrower dorsal sepal and the brownish green lip.—F. J. C.

Pentstemon isophyllus Robinson. By J. R. Sealy (*Bot. Mag.*, t. 9482; May 1937).—A hardy species with scarlet narrow-tubed flowers. Native of Mexico. F. J. C.

Polemoniaceae, Miscellaneous Eastern. By E. T. Wherry (*Bartonia*, xviii, pp. 52-59; illust.; 1936).—Gives a key distinguishing the seven genera (*Polemonium*, *Collomia*, *Phlox*, etc.) found in eastern North America, and accounts of *Collomia linearis* (*Bot. Mag.* t. 2893) and *Ipomopsis rubra*, this name being considered the correct one for the scarlet-flowered, feathery-leaved biennial usually known in gardens as *Gilia coronopifolia*; in Nature it is chiefly an occupant of sandy or gravelly land in the Southern States and under cultivation is liable to die off under moist conditions.—W. T. S.

Polemonium and Polemoniella in the Eastern States. By E. T. Wherry (*Bartonia*, xvii, pp. 5-12; illust.; 1935).—Gives distribution and distinctive characters of *Polemonium Van-Bruntiae* (75-125 cm. tall, leaves usually with 11-21 leaflets, inflorescence narrow, flowers rather deep violet, stamens almost parallel and exserted, anthers orange-yellow), this being the East American form of *P. caeruleum*, and *P. reptans* (25-75 cm. tall, leaves of 7 to 15 leaflets, inflorescence wide, flowers light violet-blue, stamens included, anthers cream colour). *P. Van-Bruntiae* is a swamp plant, rooted almost always in more or less acid humus, with a limited range; *P. reptans*, on the other hand, is an extraordinarily adaptable species, with a vast range, and very variable.—W. T. S.

Rheum, The genus and its species, a systematic review. By A. S. Losina-Losinskaya (*Acta Inst. Bot. Acad. Sci. U.S.S.R.*, ser. 1, Flora et Syst. III, pp. 67-141; illust.; 1936).—After a short history (in Russian) of the cultivation of rhubarb in Europe, the authoress gives a detailed botanical survey of the entire genus *Rheum*; this contains 49 species, distributed over Central Asia, China, Asia Minor and Siberia, belonging to 9 systematic groups; 18 are Chinese, 7 Himalayan, 13 Central Asiatic, 6 Mongolian. The paper is in Russian, but gives keys and descriptions of new species in Latin.—W. T. S.

Rhododendron niphargum Balf. f. et Ward. By J. Hutchinson (*Bot. Mag.*, t. 9480; May 1937).—Related to *R. warrifolium* but with wider and shorter leaves. It has a globular truss of numerous pink flowers spotted with crimson and snowy white indumentum on the lower surface of the leaves. It is a native of Yunnan, where it forms a large tree, and is hardy.—F. J. C.

Sauraula subspinoso Anth. By H. K. Airy Shaw (*Bot. Mag.*, t. 9472; Feb. 1937).—A shrub for the cool greenhouse from north-east Upper Burma, 3 to 9½ feet in height, with thyrsoid inflorescences 8 to 10 inches long from the axils of the upper leaves, and widely campanulate pale pink flowers deep red within. Distinguished from its near ally, *S. napaulensis*, by its longer inflorescence and its fewer pairs of lateral nerves on the leaves—not more than eighteen, while *S. napaulensis* may have as many as forty.—M. S.

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DESERT PLANTS.

By VERA HIGGINS, M.A.

[Read August 31, 1937; Mr. W. W. PETTIGREW, V.M.H., in the Chair.]

WHEN I was asked to give a title for this talk some months ago, it seemed wiser not to choose one that would set too narrow a limit, but when I came to consider the matter more closely, I found that I had chosen a subject on which one could talk for a week and still leave certain aspects untouched. So I am proposing to put an arbitrary limit and, as this is a horticultural society, I shall talk chiefly about plants from desert regions which can be and are being grown in our gardens and greenhouses.

As a preliminary, however, it will be as well to consider briefly the characteristics of desert plants. It is customary to speak of the deserts of the world as though they were entirely devoid of plant life; there are, of course, very few regions where the conditions are so inhospitable that no plants are found at any period of the year, whilst in many deserts there is a permanent cover, even though the individual specimens are some distance apart, and, wherever there is a definite rainy period, a short-lived crop of annuals is not uncommon.

Deserts are characterized by the absence of rainfall during prolonged periods; in consequence, the soil is not much weathered and may have a high salt content, since there is little leaching. Often it consists of loose sand which may easily be shifted by the wind, and the temperature of the surface soil, unprotected by a close cover of vegetation, rises considerably during the day; after sunset, however, there will be a rapid fall of temperature, with consequent deposition

of dew, which may form the chief water supply for plants during the greater part of the year.

Plants with thin, green leaves, to which we are most accustomed, would have little chance of survival under such conditions; the loss of water which continually takes place through the leaf surface could not be compensated by intake through the roots, so that the plants would soon wilt and die. It is not surprising, therefore, that plants which grow in desert regions should have undergone considerable adaptation to their environment.

There are several ways in which plants can circumvent these apparently adverse conditions.

Seeds, as a rule, take no harm if kept very dry, and will germinate as soon as the conditions are suitable; thus a number of desert plants survive the drought in the form of seeds, responding to the first rains, growing rapidly, flowering and fruiting whilst moisture is still available. Such plants, of course, are annuals, and the sudden blossoming of the desert after rain has often been commented upon. But the most interesting desert plants are perennials.

Plants which are adapted to withstand dry conditions are known as xerophytes, and their chief characteristics are a reduction of any surface from which water may be lost, and special adaptations to prevent such loss. The surface of the leaf is often much thickened, and the stomata (or breathing pores) are reduced in number and variously protected by being sunk in pits or shielded by the curling of the leaf-edges. Protection is sometimes afforded by the close overlapping of the leaves, either up the stem or crowded into rosettes. In some cases, leaves are only produced during the rainy season; thus *Fouquieria splendens*, the Ocotillo, characteristic of Mexico and Arizona, bears leaves for a short period only and, in cultivation, if the plant is kept dry during the winter months, it will be found to be fully clothed with leaves within a month of being watered again. The Creosote Bush (*Covillea tridentata*), another characteristic shrub of Mexico, is evergreen, but the leaves are covered with a kind of varnish, and the whole plant has a strong resinous smell.

A certain number of xerophytes have their leaves much reduced or entirely wanting, so that the stem takes over the functions of the leaf and becomes green. The Casuarinas of Australia show this form; the slender, green branches are channelled and bear at intervals, arranged in whorls, scale-like leaves which have practically ceased to function, the stomata and assimilating tissue being concentrated in the grooves, where they are protected. Many of the Acacias show similar, though less extreme, forms of adaptation.

One feature frequently found in xerophytes is the presence of spines or thorns. Any juicy plant would be quickly demolished by animals in these dry places if unprotected, and people sometimes speak as if the plant had designedly decked itself in this protective armour. Undoubtedly the presence of spines has been of the greatest assistance, and has given much greater chances of survival, so that,

in the course of evolution, the development of spines will have been accentuated, but their origin was certainly not due to conscious thought by the plant. The actual cause of spininess is uncertain. All plants take in a certain number of substances from the soil, or produce an excess of material which is not needed for the growth of the tissues; these unwanted substances may be stored in the plant-body in the form of oils, latex, resins and other complicated chemical compounds. Owing to the slow rate at which water can be obtained by the roots and passed through the leaves, the vital processes of xerophytes are all slowed down, and these by-products probably tend to accumulate to a considerable extent; if they cannot be accommodated within the plant tissues, they may be deposited in the outer layers or even as excrescences. Certainly when xerophytic plants are grown under conditions of continuous water supply, the spines are seldom so well developed as they would be in their natural habitat. A large number of xerophytes are characterized by the aromatic smell (they give off (the scent of the Maquis in Sicily is a well-known example), and these aromatic substances are almost certainly by-products of the normal chemical processes.

Some xerophytic plants not only protect themselves from excessive loss of moisture, but actually store water in special tissues in root, stem or leaf; such plants are called succulent, and the degree of succulence varies greatly from the *Ceropegias* such as *Ceropegia Woodii*, with slightly fleshy leaves spaced along slender stems, to the Cacti where the leaves are entirely absent and the stem green and swollen, being often columnar or spherical in form. In leaf-succulents, it is not unusual to find the leaves arranged in a close rosette for greater protection.

The chemistry of succulent plants has not been thoroughly investigated, but it is clear that they differ in this particular from more normal plants; for instance, it has been found that Cacti, instead of giving off carbon dioxide during the night, as in the normal processes of respiration, retain it within their tissues, where it is available during the succeeding hours of sunshine—a most important economy of material for plants whose transpiration must be reduced to a minimum.

The annuals of desert regions are of no great interest horticulturally, though some, such as the *Eschscholzia*, for instance, can adapt themselves to our less extreme conditions, and have contributed to the colour in our gardens.

Xerophytes may have brief periods of beauty in their flowering season, but the rigid, spiny, dried-up state that intervenes has prevented their introduction to gardens to any great extent; examples will be found, as a rule, in botanical collections, and a few, such as *Euphorbia splendens*, are occasionally seen as decorative plants.

But the flora of the desert is chiefly known horticulturally by its succulent representatives. Of these, the Cacti are the most familiar, in name at all events; unfortunately there is a marked tendency, to put it at the lowest, to call anything succulent a Cactus, especially if

it also has spines. In the interests of accuracy it should be made clear that a Cactus is a member of an enormous Family, the Cactaceae, found native only in America, from Alaska to Patagonia, though established elsewhere, as along the Mediterranean, in South Africa, and more especially in Australia, where Cacti have become a more serious pest than even the rabbit. Leaves are found in one or two primitive types, the Pereskias, for example, seldom seen here except as grafting stocks, and occasionally in *Opuntias* on the young growths, but they soon drop off; in fact, one can generalize and say that a Cactus is a leafless plant, with a much swollen stem, and very frequently bearing spines.

It is therefore quite wrong to label as "cactus" such familiar plants as *Aloe variegata* (fig. 150), the Partridge-Breasted Aloe, with its close-packed, beautifully marked leaves, or *Sempervivum arachnoideum*, the Cobweb Houseleek, familiar to all alpine gardeners—and yet the Secretary of the Cactus Society frequently receives samples of both these plants with the request: "Please, can you tell me the name of this Cactus?" Members of the vast succulent flora of South Africa are often erroneously called Cacti, though no Cacti occur native in that continent.

Xerophytic plants are found wherever desert conditions occur; but succulence appears to have developed only in certain areas. Thus the flora of the large deserts of Australia includes no succulent plants, but succulents are found throughout North and South America, and there is a particularly rich and varied succulent flora in the deserts of South Africa.

A well-known daily paper once said: "Cacti are curious plants, they have no roots"! Unfortunately, this may be true of specimens in this country which survive miserably under the most adverse conditions; but grown with due attention to their requirements, they root freely and, in their native haunts, their root systems may be of very considerable extent. The rain, when it comes, is usually very heavy and the showers of short duration, so that the best chance of making full use of the amount available is obtained by a widespread network not far below the surface, and this is characteristic of many desert plants. For the same reason, the dry soil cannot support a close vegetation, drawing its supplies from different levels, such as is found in moister districts, and the individual specimens are usually spaced out some distance apart.

There are about 2,000 different species of Cacti and, though most of these are true desert plants, some are found under less extreme conditions and, in fact, the earliest representatives were probably inhabitants of the humid forests of Central America, whence they have spread to drier regions; possibly they were better able to do this than some types of plant would have been, since even in the forests they exhibit a certain amount of succulence, due to the fact that they do not grow on the ground but epiphytically, on the branches of trees where the water supply is somewhat uncertain. In similar

situations are found the epiphytic Orchids, many of which produce a storage organ known as a pseudo-bulb, on which reserve store the plants depend during dry weather.

Why then, one may ask, is a Cactus called a succulent plant and an Orchid not included in this category? Botanically, of course, both types are succulent; but horticulturally some artificial distinction is necessary to sort out the many kinds of plants which are cultivated, and the distinction is apt to be somewhat arbitrary or perhaps to depend more on the treatment required in our gardens than on the botanical features. We thus get the anomaly that, *botanically*, any plant storing water in special tissues in any part of its body is a succulent, but *horticulturally*, only those plants are recognized as "succulent plants" which, besides storing water, are tender in our climate and need protection from frost—and that are not already included in any other recognized group! Thus an Orchid remains an Orchid (though there seems to be some doubt as to whether terrestrial Orchids should come under this heading). The shrubby Aeoniums from the Canaries are all "succulent plants," but their cousins, the Sempervivums, are "alpines" because they are hardy in this country, which is quite illogical. There are, of course, borderline cases; *Cotyledon spinosa* (also known as *Umbilicus spinosus* and *Orostachys spinosus*) is usually included in collections of succulent plants, and also appears at the Alpine Garden Society's Shows; it does not much like cool-house treatment, will not safely stand our average winters, but does best in a cold frame.

It has rather been assumed that conditions are alike in all deserts; this, of course, is not true, but the same chief characteristics are always present, though in different degrees; and consequently succulent plants assume many different forms. Whilst the collector of Roses grows his plants for the beauty of their flowers and never tires of improving and altering these to the limit of his skill, the collector of succulents is more interested in the plants themselves, and it is his aim to grow them, as nearly as he can, true to type; hybridization is not much encouraged: there are so many different species available already. But it should not be thought that succulent plants are just freaks; their form is unusual, but it is not freakish; it is a marvellous adaptation to the most unpromising conditions. And, moreover, many succulent plants have very beautiful flowers.

Since this is a horticultural society interested in the cultivation of plants in this country, I propose, in pointing out some of the interesting adaptations found amongst succulent plants, to use as illustrations plants which have been grown and flowered within twelve miles of this Hall. These could be discussed under countries of origin, but I think it will be more interesting to consider the range of types found in different Families, noting in each case the localities from which the plants come.

We will begin with the family Cactaceae, since this includes the most familiar of the succulent plants.

As has already been mentioned, some Cacti live in the damp forests of Central and South America; the Phyllocacti will be familiar to most people; their large flowers are very lovely, though the plants themselves are of no great beauty, consisting of flattened, leaf-like stems, with weak bristles in the notches. Epiphyllum, the so-called Christmas Cactus, is closely allied and of similar form. The true desert types consist of columnar or spherical swollen stems, and of these there is an enormous variety, now split up into some 150 genera. A few examples will indicate the types that do well in cultivation; obviously the tall Cerei, which may reach 40 feet in their native country, cannot be well represented here, and Opuntias (which include the Prickly Pear) can only be accommodated where there is plenty of space, for they are rampant growers for the most part.

The spines of Cacti are always borne in a special organ, the areole, which is characteristic of the family; it consists of a small cushion of felt or wool from which the spines arise; the wool is usually more prominent in young areoles, but in some species persists in old age; the spines themselves are very varied in size, form and colour, as a few examples will show.

Thus in *Epithelantha micromeris* var. *Greggii* the spines are quite small and almost hidden in the abundant wool, whilst in *Ferocactus uncinatus*, for instance, wool occurs in the youngest areoles only, and the spines may be as much as 3 inches long, some of them terminating in a hook. Plants like *Astrophytum Asterias* and *Lophophora Williamsii*, the Dumpling Cactus, are spineless, the areoles being marked only by small tufts of wool.

Most Cacti flower well in cultivation, provided they are large enough; the Echinocacti, such as the well-known *Echinocactus Grusonii*, reach an enormous size in their native country, and are unlikely to produce flowers here, but Mammillarias, on the other hand, flower as quite young plants; occasionally the flowers occur in ones or twos, but more often they form a complete ring round the plant and, as the fruits take a year to ripen, it is not unusual to have a ring of flowers surrounded by a lower ring of scarlet fruits. Amongst the largest flowers are those of the Echinopses, usually great pale trumpets, white or pink, with long tubes; most of them are sweetly scented. The most attractive of the newer introductions are the Rebutias and Lobivias from the High Andes; these are all small plants, often flowering in two years when raised from seed; the flowers are freely produced, and vary in colour from orange to scarlet.

The next most important family of plants which includes a very large number of succulent species is the Aizoaceae, to which the great group, the Mesembryanthema, belongs; the original genus Mesembryanthemum has now been split into more than two hundred genera. The shrubby types, covered with their innumerable Daisy-like flowers, are well known now as they are frequently used for summer bedding, especially near the sea, where they thrive particularly well. These plants have very succulent leaves on woody stems, but the more

interesting plants to the collector are those known as the Mimicry Plants. In shape and colour many of these so closely resemble the rocks amongst which they grow that they are extremely difficult to find unless in flower. The most extreme of all are the Pebble Plants, the Lithops and Conophytums, where the plant body consists of a single pair of leaves so closely joined that the dual origin can only be detected by the fissure across the top, through which the flower pushes. Another very interesting adaptation is shown by the "window plants"; these have more or less cylindrical leaves arranged in a rosette; in Nature, the drifting sand often nearly covers the plants so that only the tips of the leaves are left exposed; the skin is much thickened, but on the exposed upper surface is a translucent area—the "window"—through which the sunlight can penetrate to the deep-seated chlorophyll tissue.

The range of form in mimicry in Mesembryanthemums is very great and, though the flowers are all built to the same general design—a many-petalled corolla which expands widely in sunlight—the size and colour are most varied. The smallest are found amongst the Conophytums, though in this genus too there are some quite showy blooms, such as *Conophytum exertum*, where the flowers are golden and an inch across. Amongst the largest are the great yellow blossoms of the Glottiphyllums, which may reach a diameter of 5 or 6 inches.

A certain number of Euphorbias will be familiar to many people, the Poinsettia, for instance, and the orange-flowered sprays of *Euphorbia fulgens*; but not everyone realizes that of this enormous genus a very large number are true and even extreme succulents. Certain of these form large bushes covering considerable areas; the stems are green and succulent and usually thorny, and the leaves are much reduced or absent. The most interesting of the succulent Euphorbias are those found in South and South-West Africa, and some of them so closely resemble Cacti that many people find difficulty in distinguishing them. If the plants are in flower, the difference is obvious; instead of the many-petalled, tubular blossoms of the Cacti, Euphorbias bear quite small, insignificant flowers in a special inflorescence known as a cyathium, which is typical of the genus. Only when the surrounding bracts are coloured, as in Poinsettia, are the flowers easily noticed. The thorns, too, are of different origin, being either old flower stalks that have become woody or a metamorphosed shoot; they often occur in pairs, representing the stipules of a much reduced leaf.

Asclepiadaceae is a family chiefly noted for the complicated and unusual structure of the flower; many of the species are succulent, the chief succulent genera being Stapelia and the closely allied Caralluma, Huernia, Hoodia and Tavaresia, and Ceropegia.

Most of the Stapelias are fertilized by flies, and the flowers are in consequence of a lurid colouring and often have a strong smell of bad meat or fish; some of them, however, are very beautifully marked and well worth examination.

Several species of *Ceropegia* are succulent, and their flowers are most curiously formed and coloured. *Ceropegia Sandersonii* has the largest flowers, the petals being so united as to form an umbrella structure, supported on a slender tube, the colouring being pale green on white, the edge of the "umbrella" hung with little, vibratile hairs. *C. Haygarthii* does not make a cover over the flower, but the tube is open, the segments joining in the centre, from which rises a short stalk crowned by a small hairy expansion which moves with the wind. *C. stapeliiformis* has much stouter stems, very like those of a *Stapelia*, and straggles rather than climbs, whilst *C. dichotoma*, from the Canary Islands, has smooth, erect, leafless stems on which the straw-coloured flowers appear in bunches at the nodes.

We are more accustomed in this country to think of the family Liliaceae as being represented by the beautiful Lilies of which so many species and hybrids are grown in our gardens to-day. This family has many succulent representatives in South Africa, chiefly in the genera *Aloe*, *Haworthia*, and *Gasteria*. Many of the *Alocs* grow too large for successful cultivation here, but the *Haworthias*, which closely resemble them, are smaller and show a wide range of form, even including "window plants," as in the *Mesembryanthemums*. The *Bulbines* do not usually show a high degree of succulence, but *Bulbine mesembryanthemoides* has very swollen leaves.

The majority of the species of *Crassulaceae* are succulent; the *Echeverias* from America are well known as bedding plants, but there are others, some with leaves covered with hairs like silver plush, such as *Echeveria leucotricha*; the flowers are generally red and yellow. The *Cotyledons* from South Africa assume curious forms, the most interesting being those which bear a crop of succulent leaves for a short period of the year, though the rest of the time the woody stems are brown and bare. The *Crassulas* are very numerous and some of the species show very marked adaptation to environment.

Crassula mesembryanthemopsis, for instance, has close rosettes of greyish, cylindrical leaves, and looks very much like the genus from which it gets its specific name; in *C. columnaris* the much-thickened leaves, arranged in opposite pairs, are packed so closely together that the stem is invisible until it begins to elongate as the round ball of creamy flowers develops at the top. *Kalanchoe* is also a very interesting genus in this family; the plants vary considerably in form, but many of them are beautiful in colouring, such as *Kalanchoe behavensis*, whose large, felt-covered leaves are bright rust-brown, and *K. madagascariensis*, whose thick leaves are covered with silvery hairs like plush, the edges marked in dark brown much like those of *Echeveria leucotricha*; and other species have a waxy surface which gives the foliage beautiful colourings of blue, purple and soft reds.

The *Compositae* seem to occur all over the world wherever vegetation is possible, so that it is hardly surprising to find that there are succulent species in this family also. They chiefly belong to the genus *Senecio* (into which *Kleinia* has now been merged). The *Candle*

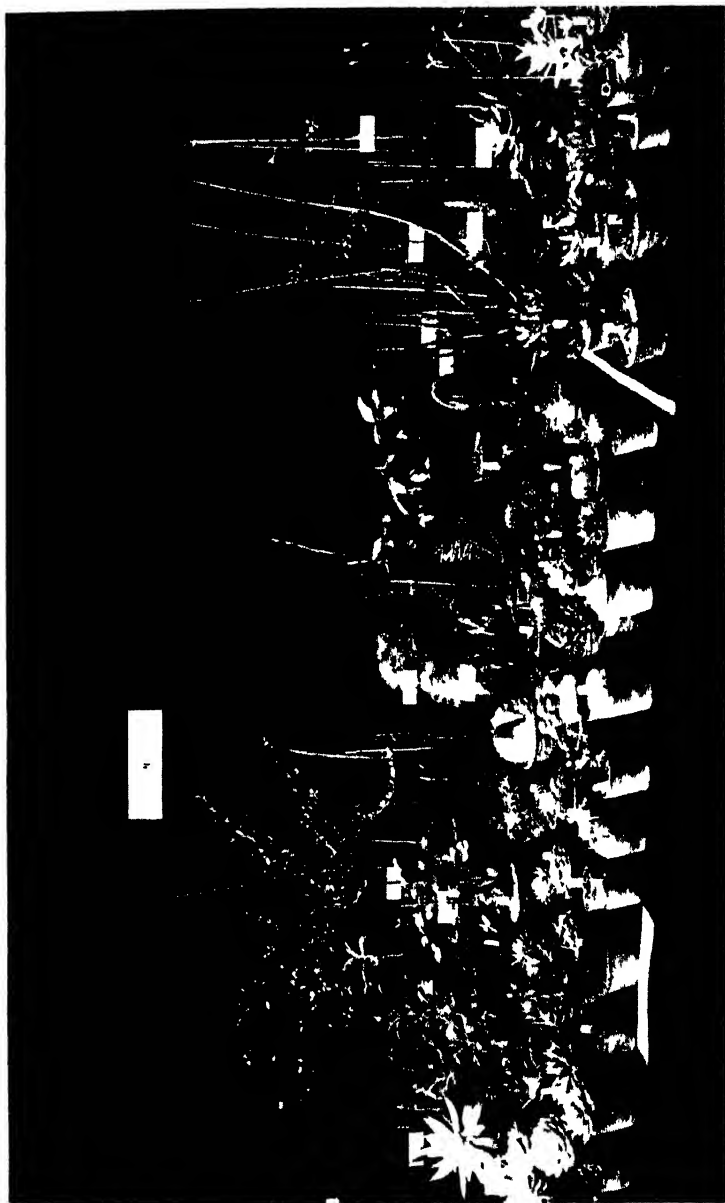


FIG 147 —EXHIBIT OF SUCCULENTS OF THE NEW WORLD

[To face p 528

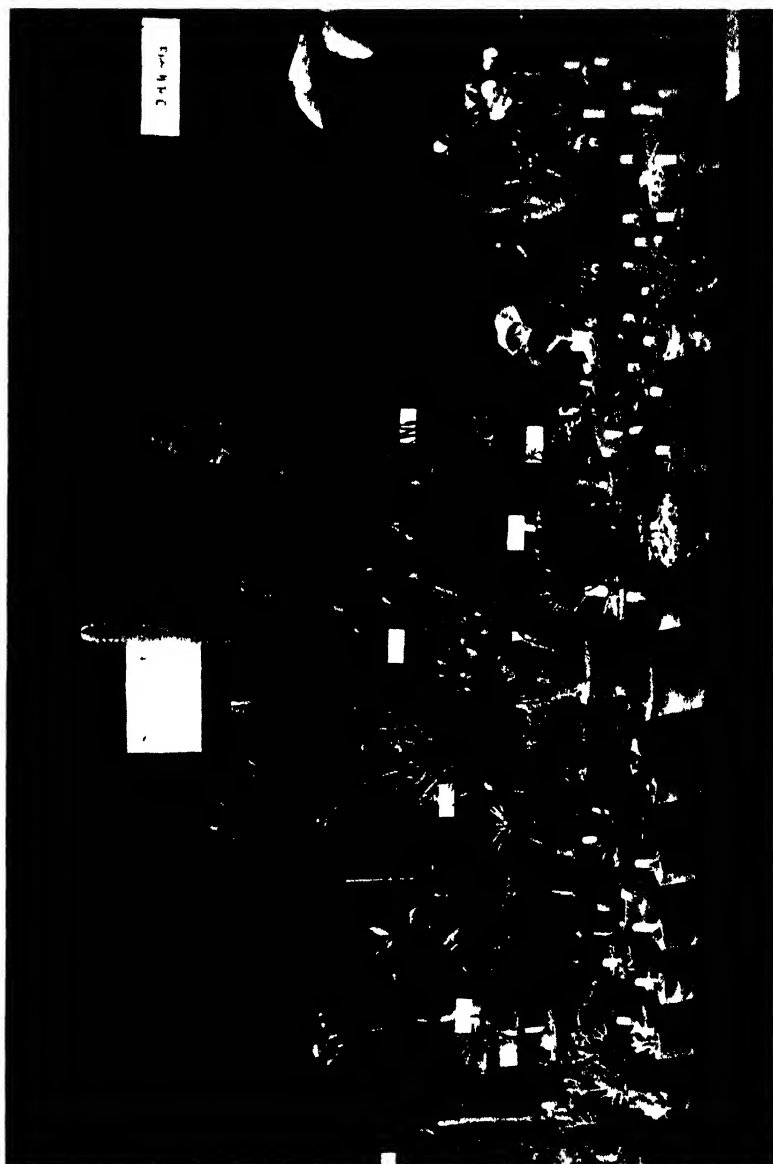


FIG 143—EXHIBIT OF SUCULENT PLANTS OF THE OLD WORLD

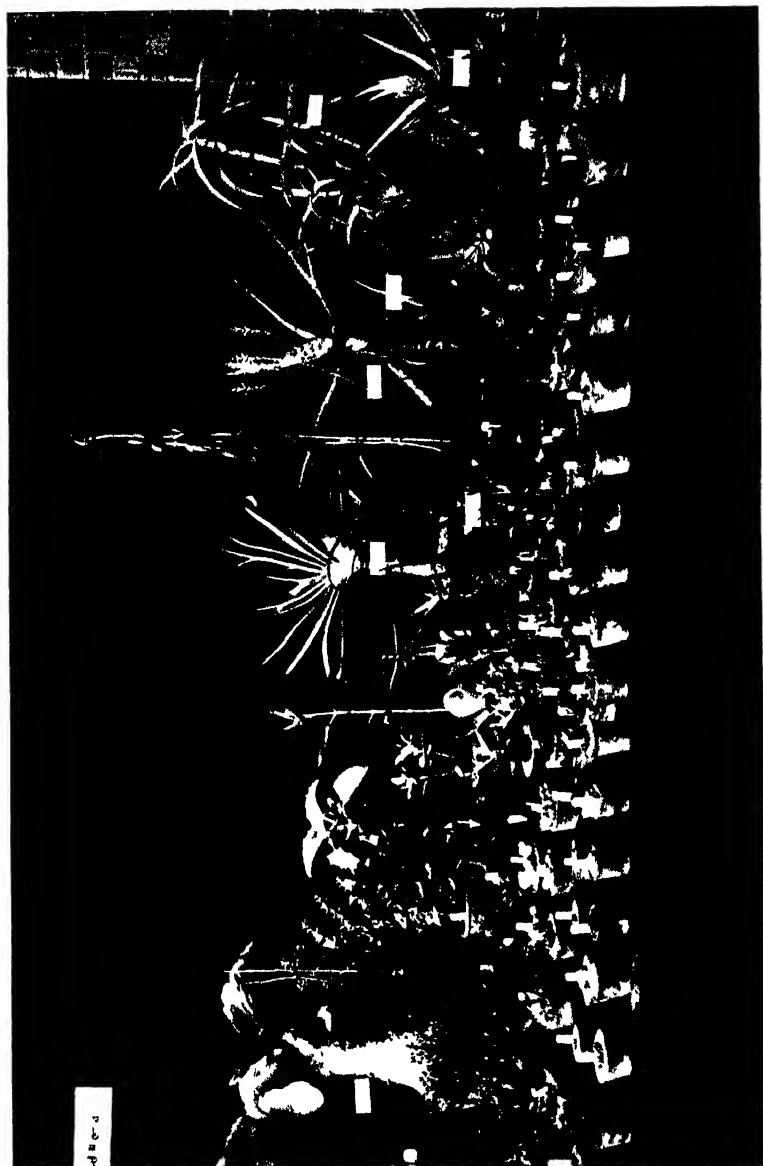


FIG 149 — EXHIBIT OF SUCCULENTS OF THE OLD WORLD

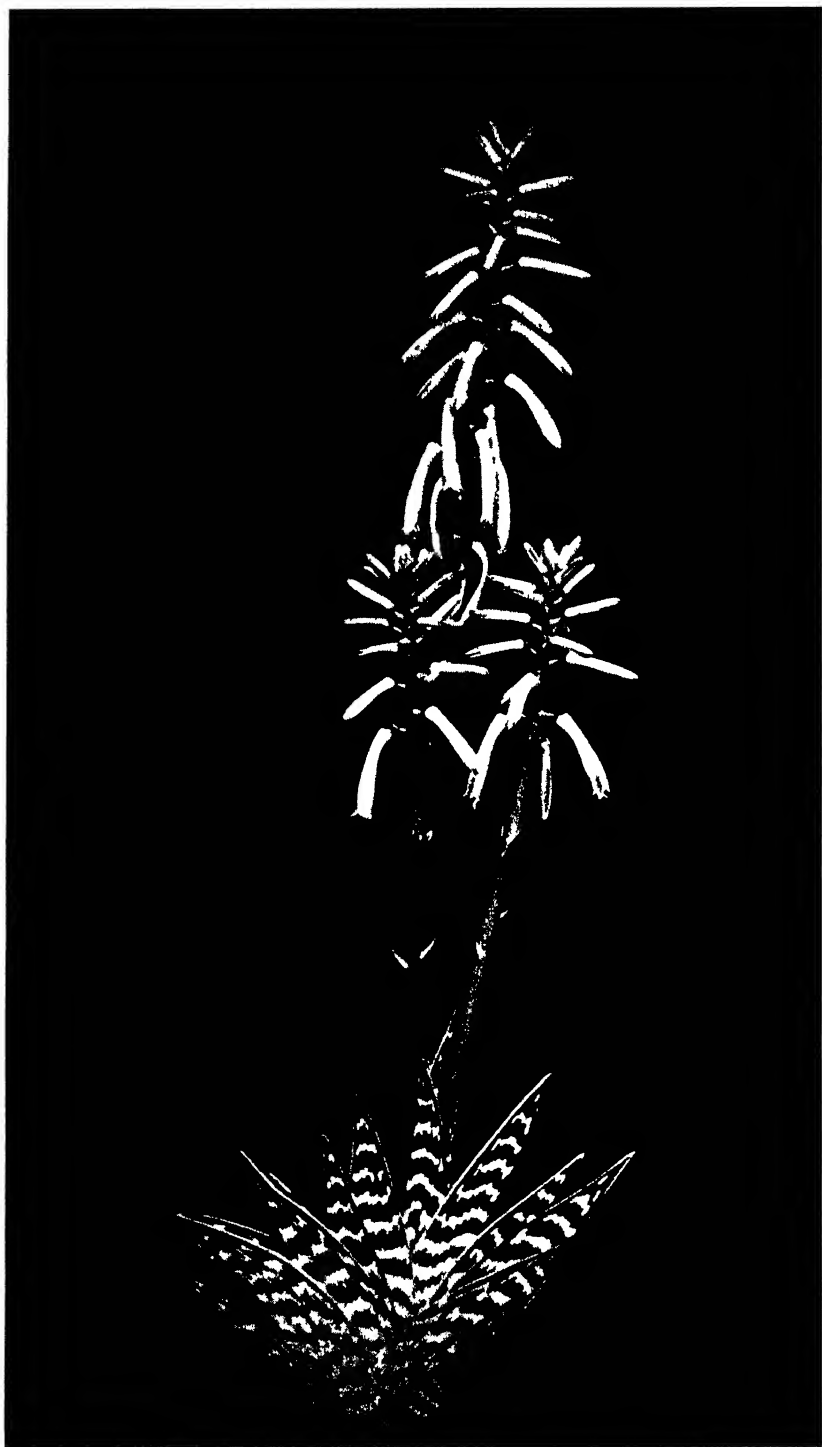


FIG 150 —ALOE VARIEGATA *

[To face p. 529.

Plant, *Senecio articulatus*, is fairly familiar, and there is *S. stapeliiformis*, in which the stem closely resembles in outward appearance that of a *Stapelia*.

These are the main groups in which succulent plants are to be found. A few isolated examples occur in other families such as *Anacampseros* (*Portulacaceae*) which, in South Africa especially, has a large number of small-growing, succulent species. Then there is *Testudinaria Elephantipes*, the Elephant's Foot, which has an enormous swollen stem where the bark develops rapidly and splits into characteristic, hexagonal chunks ; the slender leafy stem is of annual duration only, rising in old plants to a considerable height and branching freely. Another interesting genus is *Cissus*, which includes the succulent Vines ; *Cissus quadrangularis* has four-sided stems and bears leaves and tendrils much like the more normal Vines, but *C. Juttae* has a short stout stem surmounted, in the growing season, by a head of large, glaucous leaves, with panicles of inconspicuous greenish flowers which ripen into purple "grapes." An example can be seen on the left-hand side of fig. 149.

ANTIRRHINUM RUST.

By D. E. GREEN, M.Sc., Mycologist, Wisley.

[Read August 17, 1937; L. N. SUTTON, Esq., in the Chair.]

ANTIRRHINUM Rust is now a well-known disease, for it has been talked about a great deal during the last few years. Four years ago we did not worry much about Antirrhinums, for they suffered only from one or two minor diseases which did not cause much alarm. We thought these plants very useful, for they gave a wonderful and long display of colour when bedded out and were not much trouble to raise and plant. But since rust disease came we have been rather concerned about the future of Antirrhinums, and I want to explain to you what we are doing about it.

In July 1933 we received some plants from a Fellow of the Society asking what was wrong. The specimens were being killed by the rust disease, and though the plants were severely attacked it has subsequently proved that it could have been much worse.

The rust has been known in America for over 40 years and is widespread there, as it is also in Canada and Bermuda. The growers there consider it a very serious disease and especially is it feared in the seed-growing areas of California, where it does great damage to the crops grown for seed, reducing the yields to negligible amounts by killing large areas of plants. They have never been able to check its spread when the weather favours it.

In Bermuda it appeared first in 1922, and it swept over the island very quickly, destroying the plants as it went. It was this knowledge that made us wonder what it would do here, for previous to 1933 it had not been reported anywhere in Europe.

When it arrived we were thus already in possession of some of its history. We informed the Ministry of Agriculture of its presence, and both the Ministry and the Society issued warnings in the Press. The first object was to try to keep the disease localized if possible, so we advised growers to destroy all Antirrhinum plants both healthy and diseased at the end of the 1933 season, and not to keep any at all during the winter. Our reason for this I will explain later.

We were not long in doubt as to whether the rust would spread, for, after the first two reports of its presence, other specimens quickly reached the Laboratory. The first two reports came from the sides of the Thames Estuary; they were from Sidcup and Pitsea. By the end of the 1933 season (*i.e.* the four months July to October) the rust had been seen in 13 counties of Great Britain and in Jersey and N.W. France. During 1934 it continued to spread and was then in 28 counties, having reached on the west coast the counties of

Cornwall and Cardiganshire. In 1935 it was seen in Scotland and Ireland and we had to assume that it was widespread over Britain. Furthermore, it travelled across the Continent. It was reported in 1933 in France and Holland, in 1934 in Denmark and Germany, in 1935 in Italy, Czechoslovakia, and Austria, and in 1936 Egypt. None of these countries had seen it before, and we were really watching a repetition of what happened in Bermuda in 1922.

The first symptom of the disease is that the plants look rather sickly and the leaves viewed from above show lighter spots against the dark green. If a leaf is turned up so as to show the undersurface a number of dark brown spots or pustules will be found. From each of these will come a brown powder like snuff, and in bad cases if you shake a branch the powder falls like dust. Large brown patches of it may appear up the stems and finally all over the plant, which is then withering up and soon dies. In severe cases the bed may look as if cocoa had been thrown over it. Many rusts will kill slowly and usually cripple plants slowly, but by comparison the *Antirrhinum* Rust is quick in killing its host.

We usually expect to see this rust about June, but plants may be attacked at any age. Seedlings can be attacked in the boxes even on the very first pair of leaves. In such an instance we believe there must have been an old diseased plant growing near the seedlings. The rust has not been proved to travel with the seed, although there have been many experiments to test this point. We have used seed taken from badly diseased spikes, and we know the seed was covered with the fungus spores, but in clean soil protected from overhead infection the plants raised from that seed remained clean all the season.

The brown powder that comes from the spots on the leaves is formed by the masses of spores that the fungus is producing so as to spread the trouble. The fungus produces two kinds of spores, some round and single-celled and the others oval and having two cells. The first single-celled spore is for infection at once and it will be blown or washed about and should it get on an *Antirrhinum* leaf, if the weather is suitable, it will germinate and infect that leaf.

The second two-celled and thicker-walled spore is formed for surviving the winter. Most rusts have a third kind of spore which I will deal with later.

The round summer spores (uredospores) each produce a germ tube rather as a seed germinates. They do this only when the conditions are favourable; for instance, there must be enough moisture present—it is very like a seed germinating except that these spores are of course extremely small. They will germinate on a leaf surface and find a breathing pore or stoma through which the germ tube enters. It forms a sucker-like bulge or appressorium which fixes it to the pore, and then it grows down into the leaf tissues and into the cells of the leaf. The fungus threads penetrate the cells of the leaf, killing them and absorbing their contents. Very soon the threads form a bunch near the surface; the spores are then formed and the skin or

epidermis is broken by the pressure so as to release these spores. When the fungus threads enter a cell, they swell up into structures we call haustoria and so produce a larger surface through which to absorb the contents of the cell, killing it, and in the end killing the leaf. These summer spores must infect quickly, for they do not live long and not many will germinate after three or four weeks.

The two-celled thick-walled spores (teleutospores) are formed in the same pustule as the others and germinate like them. Many rusts overwinter by means of this spore form, which survives and infects another kind of plant which is called the alternate host. The fungus then lives on this alternate host, on which it forms the third kind of spore (aecidiospore), which goes back to infect the original kind of plant the next season. One example you may know is the Black Currant Rust which forms the two kinds of spores on the currant leaves, first the summer spores to spread and then the thick-walled ones which survive and infect the Weymouth Pine, on which the fungus lives to produce the third kind of spore, which reinfects the Black Currant bushes the next season. Another example is that of Wheat Rust, in which the thick-walled teleutospore infects the common Barberry bush, and the fungus lives there until the following season, when it forms the third spore to infect the wheat crop again. But in *Antirrhinum* Rust investigators have never been able to find an alternate host for the rust. Another point is that in some rusts these thick-walled teleutospores are able to germinate and infect the same plant directly with this germ tube. But although these teleutospores of *Antirrhinum* Rust germinate easily and strongly, we have never been able to get them to infect the *Antirrhinum* plant.

So the position is that there seems to be no alternate host for this rust, nor will the thick-walled spore that survives the winter infect the *Antirrhinum* again. How then does the disease survive the winter? We think it does so on those diseased plants which live through the winter in sheltered spots, so that when growth starts in favourable weather in the spring the diseased stems soon produce summer infection spores that will spread the rust. That is why we advised people to destroy all old plants, even apparently healthy ones, in the first winter (1933). We soon found that this attempt at stamping out the disease was not possible, for I found an old plant on the top of Guildford Castle which was rusted, and there were many others which were no doubt rusted that could not possibly be reached. In January 1934 the rust was seen on seedlings, and we then knew it would persist through that winter.

In 1934 the disease was very severe and destroyed *Antirrhinums* wholesale in gardens and public parks. The Council decided that work must be done to find a remedy, and I started an investigation along two lines. The first was to find what value the use of spraying with fungicides would have in checking this disease and the second was to study the possibility of breeding plants resistant to it.

In 1935 we carried out the first part of the work by a spraying test on $\frac{1}{4}$ acre of ground holding over 4,000 plants arranged in 104 plots. The fungicides we used were sprays and dusts, some containing copper and some sulphur. We used a variety of Antirrhinum that we knew was susceptible to the rust, on the assumption that if we could keep that one clean we could say the spray was efficient. When testing the value of a spray we like to use a very susceptible variety, for this gives a good test of the efficiency of the fungicide. The disease did not come very early in 1935, so we infected the plants by hand in July. On one leaf of each plant we put some of the summer spores in a drop of water. This was done in the evening of a day that looked very suitable for spore germination, for it was dull and humid.

I must explain here that in Antirrhinum Rust the infection spreads from leaf to leaf externally; our idea was thus to get one leaf infected on each plant, then, by spraying, to see whether we could keep the disease in check, that is prevent it spreading on to the other leaves.

Each plot had treatment always with its own particular spray or dust and there were some plots that were not sprayed at all, so as to give us a comparison with the treated plots as regards spread of the disease. These untreated plots in experimental work are called the control plots. They are not treated, whereas the sprays and dusts put on the treated plots cover the leaves with a protective film of fungicide. We sprayed every fortnight, putting the sprays on in the forenoon and the dusts on in the morning before sunrise so as to get the dew on the foliage to help the dust to stick. I would like to say here that on several occasions there was no trace of dew on the foliage or on the grass, although the time was well before sunrise. This fact seems to take away some of the value of a dust because it is difficult to know when to get the right conditions when there is no rain and also an absence of dew in the early morning.

In America they favour the use of sulphur against Antirrhinum Rust. We found sulphur useless and our plots showed that only the copper-containing sprays did any good. Burgundy and Bordeaux mixtures kept the plants green and healthy looking so that they flowered a second time, but these sprays needed to be put on six or eight times to get this result. While this amount of work may be useful in special instances, such as where seed is particularly wanted from certain plants, we thought it was not a practical method for amateur growers. It is not surprising that we cannot get a simple spray remedy, because in California the growers say that when the weather favours this rust it is uncontrollable. We are thus justified in thinking that spraying is not likely to be a good remedy, and we therefore turned to the consideration of whether we could find Antirrhinum plants that were resistant to the rust. Needless to say in fighting diseases resistant plants are the ideal of the plant pathologist. The question was where to get such resistant plants. In 1934 I planted no fewer than 106 of our commercial varieties and they were all badly attacked.

The American workers have been trying to find resistant plants for many years, and up to 1929 had failed to find a single plant that showed resistance. In 1930 they found some that although infected stood up to the disease well, and the seed collected from these gave plants some of which in 1931 remained rust free. From these they have continued to breed, and in the last five years have claimed to possess stocks with high resistance to rust. They found some of the species very resistant, notably some strains of *Antirrhinum glutinosum*, and they have used these in crossing with their stocks to help the resistance. It seems significant that they have gone back to original types to get what we might call a better constitution.

Soon after the rust arrived here we started enquiries to get some of these resistant plants, and with the assistance of Sir DANIEL HALL we got a packet of seed in 1934, but too late for flowering, so we kept the plants on. In 1935 we got some more seed and raised about 550 plants, which we planted along one side of the ground used for the spraying trial just described. These resistant plants were not protected by any spray, but were infected with rust spores three times, and you must remember that they were growing next to the 4,000 odd plants used in the spraying trial which were diseased from July onwards. There must have been a very heavy drift of spores on them for some four months, yet, at the end of the season in October, 77 per cent. of them were quite free from rust, whereas nearly all of the spraying trial plants had been killed. I must admit the colours of these resistant plants were poor and the plants were of very mixed type and habit, but it must be remembered that they were the result of many crosses aiming for one thing first, and that was to get plants resistant to the rust without much regard for colour. We of course destroyed any that showed the least sign of the disease and took seed from those we considered the best for colour and habit. In all we took 24 samples of seed.

Last year (1936) we had a trial of plants to test their resistance to the rust. The trial was made up of the 24 samples of seed to which I have just referred, as well as 33 stocks claiming resistance sent to us from America, together with 12 commercial varieties. The plants were planted on the infected ground used in the 1935 spraying trial and were infected twice, each plant by hand. The disease was not severe last year, which was a pity, because we wanted these plants to have a severe test. The rust did not spread much until the end of August; this also was awkward, as we wanted to see which plants and stocks remained clean so as to get their seed, and seed is difficult to get in September when it is wet. The plants for seed were protected by placing a fine muslin bag over a single spike and tying the neck or by placing a large muslin bag supported by wire over the entire plant like a cage. In fine weather the seed sets quite readily, but you can assist pollination by squeezing the open flower gently inwards at the sides without even taking the bag off.

At the end of the season every plant was pulled up, and many

had to be examined leaf by leaf for a sign of rust. The rust not being severe made this work harder, because we could not say that the plant was infected at sight and we had to examine most of the leaves of a very large number of plants. One rust pustule on a leaf condemned the plant, and many of the plants we had selected for good colour took the disease later in the season.

What is meant by resistance? In this work the American stocks all claim 75 per cent. resistance. This means that 75 per cent. of the plants—75 out of every 100—will not take the disease. The other 25 may take it quite severely. Now take our results. The 12 English commercial varieties which possess such fine flowers showed quite high infection even last year when the rust was not severe. The best showed 62 per cent. resistance; five of these stocks had no resistance and were 100 per cent. infected. The Wisley-bred seedlings which had been bred from the American parents received two years before all showed above 75 per cent. resistance, and two stocks were quite free from rust. The latest American resistant stocks showed over 75 per cent. resistance, except one which upset us very much. This stock was sent from America, claiming 90 per cent. resistance, but it showed only 57 per cent. resistance on our plots. We do not propose to try to explain this as we did not breed the plants nor take the seed and do not know the history of the stock. A mistake can very easily arise in this work.

Our net result then was to show that the stocks claiming resistance did possess it at least to 75 per cent. That meant that 75 plants out of 100 did not take the rust even when it was deliberately put on the foliage. We selected the best colours out of the most highly-resistant stocks and saved the seed. This year we have again obtained the best strains of the American resistant seed and we are growing them alongside plants raised from the seed we take ourselves from good-coloured plants, all of which are really descended from the seed we got from America in the first place. In short, each year we are matching our own selections for colour and resistance to rust against the latest American-produced resistant varieties, which I must say the American growers are very willing to send over to us for test. Now what is the position and what are our difficulties?

To me the disease in 1934 seemed so severe as to be of the nature of an epidemic; 1934 was hot and dry and some people claim that only in such weather are we likely to get much *Antirrhinum Rust*. Yet the disease spread in 1935 and every year we have complaints about it from certain localities. Some public parks suffer severely and the beds become unsightly at a very awkward time in the season. On the other hand, in other places a good show is seen and the plants are clean. The position seems to be that you may be fortunate and escape the disease, but there is no telling when it will start nor how severe it will be. As I have said, if you do not keep any old plants through the winter but start with young ones each spring you will in most seasons increase your chances of escaping this rust and

having a good show of Antirrhinums. But this is unsatisfactory where 100,000 or more plants are raised for bedding out, and we must therefore try to eliminate the possibility of this disease spoiling the plants. The only way is to get plants that will not take the disease, and this we are hoping to do ; but there are difficulties, which I must now try to explain.

There is no doubt that there are plants that possess a factor for resistance to this rust, but where you get a highly resistant stock it possesses poor coloured flowers. The American workers say that the resistant factor is a simple and dominant one, and I think they have proved this by various experiments. This being so we ought to be able to get the resistant factor into better-flowered plants. Improvement has already been made from the original resistant types, but there is still much to be desired when the present resistant strains are compared with our commercial varieties which are unfortunately so susceptible. To improve the flowers of the resistant ones we are forced to cross them with the susceptible good-flowered ones. We then get in the progeny a mixture of resistant and susceptible plants in which we find most of the good-flowered ones are susceptible. You will remember the present resistant ones are only claiming 75 per cent. resistance. We are aiming at getting a good-flowered stock which is completely resistant. Even now we may get one which is completely resistant, but it has a very poor flower. If we can get two or three good-coloured 100 per cent. resistant plants, we can cross them, and hope to get variations of colour in the progeny from which pure stocks can be bred, all being fully resistant like the parents. We take a completely resistant plant with poor flowers (it is homozygous for resistance) and we cross it with a good-flowered but susceptible stock. The progeny will not take rust because the resistant factor is dominant, but the plants are hybrids and carry the susceptible factor as well. Thus if they are selfed (*i.e.* fertilized with their own pollen) the progeny will appear roughly in the following proportions : 25 per cent. like the fully resistant grandparent, 50 per cent. like the parents being hybrids, and 25 per cent. like the susceptible grandparent. Because the hybrids do not take the rust (owing to their possessing the resistant dominant factor) these proportions really show as 75 per cent. resistant and 25 per cent. susceptible plants. Now all the plants showing resistance would need to be selfed again so as to find out which are the fully resistant ones. The progeny from fully resistant selfed plants would all be resistant, whereas those from the hybrids would include some that would take this disease, because, as I have shown, the progeny of a selfed hybrid would contain roughly about 25 per cent. susceptible plants.

If we cross one of the hybrids back with the good-flowered susceptible parent the progeny will be composed of roughly 50 per cent. resistant hybrids and 50 per cent. susceptibles. In order to improve the flowers this cross is done time and time again, using the best-coloured of the resistant hybrids out of each generation, and of course

destroying the susceptibles. When most of the plants have good flowers a large number of them can be selected and these selfed so as to discover, through the progeny they give, which are fully resistant and not hybrid.

So far we have stocks of these resistant hybrids which are 75 per cent. resistant, and in which the colours are improving. At Wisley last year the strains most true to colour were the tall varieties, especially the yellow ones. The tall pink ones were very good but not quite so true for shade.

The smaller intermediate varieties were not quite true for colour, but I may say that those we have this year are better. They are level in habit, but the colours are still not of the quality of our ordinary commercial varieties. You must remember that we have to confine ourselves to selection only from stocks which show themselves to be highly resistant to rust ; this is the important character, and no matter how good a flower may be it is rejected if the plant is not rust-free. This limits our choice, and in any case if we get a fairly good-coloured rust-free plant it has then to be selfed, after which the progeny may show a wide range of mixed colours needing much re-selection work to get the stock true for colour. There are other characters, such as habit, size of flower, and type of flower spike, which all need breeding for by selection, and this takes much time.

You will understand how it is that after all these things have received attention we are only able at present to show somewhat dull colours in combination with high resistance. The American workers are also breeding and selecting with the same object in view, and I hope we shall soon obtain plants which will contain good flower characters combined with absolute resistance to this rust.

[*Later.*—The results of the tests for rust-resistance in the plants sown in 1937 are now available. Of four old varieties all plants succumbed to rust in August. Of six Wisley-raised stocks one showed every plant diseased. Of the other five the resistance shown was respectively 76 %, 73 %, 61 %, 61 %, 50 %. Of eight American resistant varieties, two showed every plant free from rust and resistance in the others 91 %, 83 %, 81 %, 76 %, 76 %, 73 % respectively.—D. E. G.]

SUBURBAN MARKET-GARDENING FIFTY YEARS AGO.

By G. E. FUSSELL, F.R.Hist.Soc.

IN 1879 the Royal Agricultural Society held an International Exhibition in London and in connexion with it ran a prize competition for market gardens in the vicinity of the Metropolis and for market-garden farms in the Home Counties and within 50 miles of London. Six classes were decided upon, market-gardens between 10 and 50 acres forming one class and above 50 acres another. The farms where market-garden crops were grown in alternation with farm crops were not restricted as to size.

The Society, which had expected a large entry and had provided three prizes in each class, was sadly disappointed. Although a great deal of land near London was devoted to this kind of production only half a dozen entries in all were received. The market-gardeners and farmers had a decided objection "to let the secrets of the prison house be made public" and would not enter. The reasons for the competition were most cogent. They were an attempt to extend the cultivation of vegetables and herbs and to make supplies available to the lower middle and artisan classes, at the same time bringing more profit to the grower.

Vegetables had been almost at famine prices in the beginning of the year owing very largely to severe frosts followed by continuous wet weather, but normally the system of distribution was open to criticism and the much maligned middlemen were severely condemned in the opening paragraphs of the judges' report. Foreign competition, too, was making itself felt, although the judges held the opinion that the overseas supplies came in at different seasons from those when the home produce was marketed. The entries for the prizes, few as they were, satisfied the judges that market-gardening in the suburban area needed a good deal of capital outlay, but was on the whole profitable.

The first prize in Class I, for a farm of less than 50 acres, was won by WILLIAM JOHN GAY, who had 44 acres close to Barking, Essex. His was "a typical market garden, worked in the most approved manner, with every inch of it highly and thoroughly cultivated." He had no special rotation, but tried to get two crops a year off all his land. He grew onions, carrots, parsnips, spinach, peas and potatoes in the early spring after winter "greenstuff," Brassicæ of various kinds, had come off the land. After cabbages at the end of May, potatoes, scarlet runners, French beans, blue peas, red beet, marrows, cucumbers and lettuce were planted. And all manner of herbs were grown: thyme, marjoram, sage, mint, parsley and lemon thyme.

Four horses and a pony were worked on the land and used for hauling the produce to market, animals of a high grade, which cost

70 to 80 guineas each. Manure from London stables and cowsheds was brought back in the market waggons and not less than thirty tons of this was put on every acre of the land. The then available artificials were also used—horse-hoof parings at from 3 to 4 cwt. an acre, horn shavings at 8 to 10 cwt. an acre, bone dust at 10 cwt., guano at 5 cwt., nitrate of soda at from 2 to 4 cwt.—so GAY must have spent a great deal of money on keeping his land in good heart.

The judges were satisfied that all this expenditure, in addition to a heavy bill for labour, paid well, but GAY's book-keeping was rudimentary, like that of most of his competitors, who deemed it unnecessary to keep accounts if their bank balances were on the right side.

The second prize farm in this class was at Corbetstye, near Romford, and the first prize for the larger gardens was secured by JOHN LANCASTER, of Vine House, Canning Town, who had 80 acres at Stratford. He was more or less of a specialist and had a good reputation at Covent Garden for celery.

He was an ingenious man, and had irrigated his land, controlling the flow of water by means of a steam engine, an innovation which moved his neighbours to mirth until they saw the benefit he got from it in the dry season, the very first after he made the installation.

LANCASTER'S system of growing celery was either to sow the seed in heated frames, whence the plants were put out in rows, or to sow the seed in hot-houses, the plants being pricked out in frames and then planted out. London manure a foot deep was put into the trenches and covered with soil. The trenches were 5 feet 6 inches apart and the plants 1 foot apart in the row. Earthing up was done gradually by hand. The next spring radishes followed, or cabbage or colewort. Cauliflowers and lettuces were also grown and marrows in frames. Rows of osiers were planted here and there as shelter for the more delicate plants and to provide twigs for tying bunches or for basket making. There were 2 acres of mint and a fine show of rhubarb. LANCASTER kept 7 horses, but did not keep accounts because he was too tired to write after his marketing. He had transformed a grass farm of old meadows into a market garden in a few years, and the judges remark on the courage, capital and ingenuity the undertaking had required. It was a very oasis in a wilderness of building land.

South Hall Market Garden, which took the first prize in the farm class, was one of a series of market garden farms, totalling 700 acres, and situated in various parts of Essex. It was an enormous undertaking and very heavily capitalized. Two traction engines and a set of Fowler's steam tackle were in use and 900 hands and 70 horses were employed in the height of the season. There were shops for wheelwrights, carpenters, basket-makers, blacksmiths, and all necessary repairs were done, waggons, vans, carts and implements so far as possible being made on the premises. The farm was, of course, much larger than the average, but was characteristic of a good many farms in Essex, near London, where the farmers grew cabbages, peas, onions,

scarlet runners, potatoes, carrots, parsnips, marrows, cucumbers and French beans alternately with the ordinary farm crops.

A more regular rotation was practised than on the smaller undertakings, *i.e.* (1) potatoes intended to come off in time to plant (2) autumn cabbages, (3) spring cucumbers, (4) winter onions, (5) cabbages, (6) potatoes, (7) carrots or parsnips, (8) wheat, (9) oats, (10) broccoli, (11) potatoes or scarlet runners, (12) coleworts, (13) peas, (14) Brussels sprouts. Twenty-five to thirty tons of London manure an acre was applied, and refuse fish from the fish markets at 5 to 8 tons an acre for summer crops and horn shavings and nitrate of soda to some extent.

Most elaborate accounts were kept, as it was essential that they should be, and showed fine profits at a time when most farmers were suffering badly because of the frightful season and the fluke in the flocks. The second prize farm is also described, but it will be enough to say here that the judges were highly impressed with the advantages of this type of farming and felt that if it were more widely adopted in possible situations the farmers would be helping themselves, and would be doing a great deal of good to the nation by supplying fresh wholesome vegetables to townsmen who found it difficult to get them.

PLANTS TO WHICH AWARDS HAVE BEEN MADE IN 1937.

Amaryllis Belladonna 'Hathor.' A.M. September 29, 1937. From Messrs. Perry, Enfield. A very handsome variety raised in Australia. The stout scape attains a height of nearly 2 feet and bears about 16 medium-sized flowers of good substance, white except for a tinge of ivory at the base.

Aphelandra Fascinator. A.M. October 26, 1937. From Messrs. Russell, Windelsham. A very striking, semi-shrubby plant from the forests of Colombia, easily grown in the warm greenhouse. The soft, elliptical leaves are 6 to 8 inches long, rich green above and marked with silvery bands along the midrib and lateral veins, purple beneath. The short, terminal flower-spikes are closely set with large, very showy scarlet flowers. The upper lip of the corolla is erect and concave, the lower 3-lobed and spreading.

Berberis vulgaris var. asperma. A.M. October 26, 1937. From E. W. Mooring, Esq., Witley. This is the rare, seedless form of the common Barberry, and, judging by the specimens exhibited, it must be one of the most beautiful members of this highly decorative genus. The bright scarlet, elliptical berries are very freely produced in long racemes hanging from pendulous branches, the rich green of the foliage affording pleasing contrast. A good coloured plate of this variety was published in *The Garden*, 85 (1889), p. 264.

Calceolaria Pavonii. A.M. October 12, 1937. From T. Hay, Esq., Hyde Park, London. A Chilean species suitable for the cool house or for summer bedding. The sturdy stems are several feet tall and bear deep green, rugose triangular leaves on long, winged stalks. The large, pouched, canary-yellow flowers are produced in massive terminal panicles.

Chrysanthemum 'Bertha Collier.' A.M. October 12, 1937. From Mr. H. Woolman, Birmingham. A large, pale sulphur-yellow, Japanese exhibition variety with long, broad, curling florets.

Chrysanthemum 'Carisbrooke.' A.M. October 26, 1937. From Mr. J. Maher, Hampton. A deep yellow Japanese exhibition variety with flowers of medium size and good form. It is a seedling from 'Edward Page.'

Chrysanthemum 'Edith Lane.' A.M. October 12, 1937. From Mr. H. Woolman, Birmingham. A large Japanese exhibition variety with long, broad, curling, rosy-chestnut florets having a prominent light golden reverse.

Chrysanthemum 'Gwen Masse.' A.M. October 26, 1937. From Mr. T. Tyson, Crawley. A useful silvery-pink market variety with rolled florets. It is the result of a cross between 'Rose Précoce' and 'September Glory.'

Chrysanthemum 'Janté Wells.' A.M. October 26, 1937. From Messrs. Wells, Merstham. A very delightful Pompon variety with bright yellow flowers measuring $1\frac{1}{2}$ inch across. It is very free flowering and is suitable for the outdoor border.

Chrysanthemum 'Mary Elizabeth.' A.M. October 26, 1937. From Mr. J. Maher, Hampton. An incurving Japanese exhibition variety with broad bright chestnut florets having a prominent golden reverse. It is a seedling from 'Edward Page.'

Chrysanthemum 'Toreador.' A.M. September 29, 1937. From Messrs. J. & T. Johnson, Tibshelf. A good Decorative variety of excellent form with bright chestnut-red florets having an old-gold reverse which is conspicuous at the centre of the flower.

Fothergilla monticola. A.M. September 29, 1937. From Mr. W. J. Marchant, Wimborne. A North American shrub with somewhat stiff, copiously branched growths bearing roundish, ovate or obovate, coarsely toothed leaves 2 to 3 inches long. It is chiefly valuable for its autumnal colouring, the leaves at that season assuming brilliant shades of scarlet and crimson; but it is decorative also in early spring, when it bears clusters of feathery, creamy-white flowers.

Hibiscus syriacus 'Woodbridge.' A.M. October 12, 1937. From Mr. R. C. Notcutt, Woodbridge. *Hibiscus syriacus*, the 'Shrubbe Mallow' figured and described by Parkinson three centuries ago, is a plant of many varieties, still widely grown and valued for its bright autumnal display. 'Woodbridge' is an exceptionally fine variety with flowers nearly 4 inches across of deep rose, faintly shot with bronze, and blotched at the base with carmine. Raised by the sender from seed of the variety 'Hamabo.'

Laeliocattleya × 'Invicta' var. 'Accession.' A.M. October 12, 1937. This attractive hybrid was produced by crossing *L.-c.* × 'Labiosa' with *L.-c.* × 'Momus.' The flower is well-formed, deep rose in the sepals and petals, rich rose-purple in the labellum, and old gold in the throat. Exhibited by Messrs. Stuart Low, Jarvis Brook.

Rose 'Sam McGredy.' A.M. September 29, 1937. From Messrs. S. McGredy, Portadown. A large Hybrid Tea variety of good shape with broad, rolled, pale creamy-yellow petals.

Saxifraga Fortunei. A.M. October 26, 1937. From the Director, R.H.S. Gardens, Wisley. A large, Japanese species of the Diptera Section, valuable on account of its late flowering season. The dark green, rounded and lobed leaves form basal tufts from which arise loosely paniculate inflorescences a foot high, bearing numerous starry, white flowers. See JOURNAL R.H.S. 60 (1935), fig. 20.

Sophrolaeliocattleya × 'Rosamund,' Westonblt var. A.M. September 29, 1937. *Cattleya* × 'Dinah' × *Sophrolaeliocattleya* × 'Magnet.' The flower is of medium size, of a pleasing deep-rose in the sepals and petals, and ruby-crimson in the round labellum. Raised and shown by Messrs. H. G. Alexander, Tetbury, Glos.

Syringa microphylla. A.M. September 29, 1937. From Mr. R. C. Notcutt, Woodbridge. This Chinese species of Lilac has the useful



FIG 151 —TAGETES ERECTA 'GOLDEN CROWN.'

(p. 543)

[To face p. 542



FIG 152 —HRAIRS, SHRUBS AND DAFFODILS AT WISLEY, MAY 1937



FIG 153 —ROMNLYA COULTERI IN DR. STOKER'S GARDEN, LOUGHTON



FIG. 154 — VZAIKAS AT WISLEY MAY 1937.

[To face p. 543.]

habit of producing a second crop of flowers in late summer or autumn at the tips of leafy shoots. The fragrant flowers are rosy-lilac, darker externally.

***Tagetes erecta 'Golden Crown.'** F.C.C. September 16, 1937. From Messrs. Watkins & Simpson, London. Plant of vigorous, compact habit, 18 inches tall, freely branched and free flowering. Foliage of medium size, dark green. Flowers semi-double, 3 inches diameter, light golden-yellow, petals flat, wavy at margins. A true, even stock (fig. 151).

Vanda Sanderiana var. 'Olympia.' F.C.C. September 29, 1937. A superb form of this handsome species from the Philippine Islands. The plant bore two spikes, with 13 and 10 flowers respectively, and, as is usual with this species, the richest coloration is displayed by the two lateral sepals. Shown by Messrs. Sanders, St. Albans.

* After trial at Wisley.

GARDEN NOTES.

Precocious Flowering of Rhododendron Hybrid.—As an example of precocity of flowering in *Rhododendron* hybrids, I find that a batch of a cross of which *Rhododendron Griersonianum* was the seed parent and *R. calophytum* the pollen parent, seed of which was sown in 1934, has flower buds on every other plant. This is the more remarkable as the cross takes strongly after *R. calophytum*, which itself does not flower as a young plant. There are here some 15 plants of *R. calophytum* grown from E. H. WILSON's original seed sent to England in 1900. In the first twenty-five years of their life these 15 plants produced during the whole period not more than a dozen or so trusses between them.—*Lord Aberconway, Bodnant.*

Growing Succulent Plants.—Growers of these plants are invariably warned against watering them too freely. Not only so, but the further advice is usually given to withhold water altogether during the winter. The result of this is that a "bone-dry" condition is reached in the pots under glass for months on end, with inevitable damage to the plants. I have often noticed succulents in a state of suffering under this condition, which does not obtain in Nature. It seems to be forgotten that in the rainless areas there are nevertheless heavy dews at night, and that from the lower depths of the soil some slight exhalation proceeds. Under glass these two sources of moisture are rigorously excluded. Succulents in captivity need a slight watering occasionally, even in winter, but it must be judiciously supplied.—*Rev. T. A. Hyde, Avonwick, S. Devon.*

Interesting Plants in Wisley Glasshouses.—There are two species of *Passiflora* fruiting at Wisley. One is *Passiflora edulis*, which yields the small, delicious fruits now frequently seen in fruit shops and sold as 'Passion Fruits.' The small seeds are surrounded by a rich pulp which fills the fruits. They should not be eaten until quite ripe, a stage denoted by some shrivelling of the skin. The top of the fruit may be removed as with an egg, and the contents consumed with the aid of a spoon after stirring in sugar to taste, or the fruits may be emptied into a glass and the pulp flavoured with such aids to the palate as port wine. No attempt need be made to extract the seeds before eating; it would be extremely difficult anyway. The Wisley plant fruits well and plenty of root room would ensure it covering a wide area of the roof. It is a native of Brazil now widely grown wherever it will succeed.

The other *Passiflora* seen is *P. quadrangularis*. This is a rampant grower producing large, handsome flowers. Its fruits grow to the size of a small melon, and, although they bear the attractive name of 'Granadillas' they are extremely disappointing as fruits. They have a very thick, fleshy coat containing a small amount of pulp with rather large seeds. The small amount of pulp, if it be separated from

the seeds, is tasty, but inferior to that from the fruits of *P. edulis*. The best way to make use of Granadillas is to cook them before they are ripe as one would a vegetable marrow, but they are not superior to that vegetable. The Wisley plant is bearing several fruits and growing very happily in one of the smaller houses. It is a native of tropical America. It should be added that there is some confusion in the use of the name 'Granadilla' as in some cases this is also given to the fruit of *P. edulis*, but 'Passion Fruit' seems now to be the generally accepted name for the latter.

Cyphomandra betacea, the 'Tree Tomato,' is a member of the Order Solanaceae. The Wisley plant is a robust specimen with clusters of fruits. The fruits of this plant are very beautiful when coloured, being smooth, egg-shaped, and reddish yellow striped with green and purple. The flavour is that of tomato and gooseberry mixed, not attractive to many persons. Stewed, or made into a preserve, they are more palatable, but there are better fruits for these purposes. The Wisley plant is doing very well and bearing more robust foliage than is usually seen in the tropics. The plant is a native of South America.

Psidium Cattleianum, the 'Purple Guava,' is the best of the Guavas. Its fruit is rather acid for dessert but is gratefully eaten by the traveller who can get no other fruit. For cooking or preserve making there is none better and Guava jelly is a delicacy. The Wisley plants bear a few fruits, although growing in very small pots. They would quickly make large specimens if given generous treatment. The plant belongs to the Natural Order Myrtaceae, and the fruits have the aromatic scent and taste common to that Order. It is a native of Brazil.

Beaumontia grandiflora is growing in very small pots, giving little indication of the great woody climber it becomes in the tropics. There is no more impressive sight than a large plant of this species enveloping a great tree, and bearing great trusses of large white trumpet flowers each over six inches long and scented. Wisley cannot hope to do much with this plant which, in the tropics, is considered too massive for a pergola or even for a house climber, but must be allotted a large tree for support. It belongs to the Natural Order Apocynaceae and is a native of India.

Brachyglottis repanda is a shrubby Composite from New Zealand, and is interesting from the fact that the underside of its leaves may be written upon. No farther away than the Scilly Isles it grows to a large size and forms handsome small trees.

Sparmannia africana is grown in a good many gardens for its handsome foliage and pretty flowers. It is by no means a hothouse plant, but grows to a large size in the Scilly Isles. It is interesting on account of its sensitive stamens, which move sharply when touched. The bast from its growths contains very strong fibres, and in Africa strips of it are used to tie in position the rafters of houses. As no nails are used in addition, the durability of the fibres may be gathered. It is a member of the Natural Order Tiliaceae, an Order which unites many plants yielding fibres of value.—*E. Brown.*

BOOK REVIEWS.

"Sussex Recipe Book: with a few Excursions into Kent." By M. K. Samuelson. 8vo. 188 pp. (Country Life, London, 1937.) 5s.

This new volume of the Country Life Library contains an entertaining variety of old and new dishes.

Herbs such as "shives, thime, close lettice and sorrel" seem to have been in great demand in the early eighteenth century, but spinach had an unexampled popularity. It is found in soups, as a vegetable, a colouring, and even in a tart, liberally endued with a generous amount of cream and eggs.

Cardoons were dug from waste places, transplanted, earthed up, and when blanched, boiled and eaten with butter and white sauce. Like the spinach "Tourte," an "Artichoak Pye" was a sweet, and Skirrett pie appears to have been a favourite of the time. Samphire pie, if intended to provoke a noble thirst, was indeed admirably fitted for its purpose, otherwise it can have made but penitential eating. A recipe for pumpkin pie raises the question of whether we have here the authentic ancestor of the famous American pies, while pork and apple pudding is also claimed by Kent.

Tansies, so beloved by eighteenth-century housewives, were coloured green with either tansy or the indispensable spinach, and Sussex has preserved many cherished recipes for pickling ash keys, cucumbers, melons, and barberries for winter use, while cherries were dried, and bullaces made into cheese for the store-room.

Verjuice, gooseberry and elder vinegar were also home made, and local wines of repute were found in many a farmhouse cellar. Most unusual among them are those made from sloes, sage and "Hogasses" or hawthorn. Pea-shuck wine and an English Sack, made of rue and fennel root, seem to call for courage or desperation in the most confirmed of toppers. This book is a feast indeed for all true Sussex men.

L. YARDE BUNYARD.

"Nuts" Bull. 106. Ministry of Agriculture. 8vo. 36 pp. (H.M. Stationery Office, London, 1937.) Paper covers. 1s. 6d.

The latest of the useful series of pamphlets on fruit cultivation published by the Ministry will be valued by those who are interested in the growing of Walnuts and Cobs and Filberts.

The investigations into propagation of and search for Walnuts which will thrive in our climate which are being undertaken at East Malling are described by Joyce Hammond in detail and photographs of grafting technique added. Dr. Massee provides some useful pages on the treatment and recognition of such diseases as nuts are unfortunately heirs to.

The section treating Cobs and Filberts by A. K. Hoare is shorter but covers the ground very well.

Propagation, pruning, manuring, &c., are given detailed treatment, but we are rather at a loss to see why it should be stated that the fruit grower should raise his own trees "as he is able to select and propagate desirable types."

The varieties recommended have been propagated by Nurserymen for a century or more; have they thus become less desirable, or are we to assume that a "desirable type" is distinct from a recommended variety?

The costs of market production and probable profits are rightly tinged with a certain discretion, the planting of Cob Nuts having been of late years a little discouraged by changing habits, and by the planting of nut orchards on poor land and neglecting them.

Cob Nuts will grow on a very thin and poor soil, and crop well, provided they are well fed; without such treatment they become unprofitable.

We notice a slip which can perhaps be remedied in a future issue: the Red and White 'Lamberts' are not, as described, distinct varieties, but the German names for our Red and White Filberts.

E. A. BUNYARD.

"The Dragonflies of the British Isles." By Cynthia Longfield. 8vo. 220 pp., 38 plates, numerous text figures. (Warne, London, 1937.) 7s. 6d.

Among the many volumes which make up the "Wayside and Woodland Series" there are few which reach the high standard set by the one under review.

The author is hopeful that this volume will fill a need, and it is certain that such a desire is fulfilled, for the collector of this most pleasing group of insects has for many years been dependent on W. J. Lucas's "British Dragonflies," a standard work that has long been out of print.

The volume is well illustrated both with photographs of the adult and immature (Naiad) stages, and with line drawings of the wings, bodies, heads and anal appendages of all the British species. Coloured illustrations have a greater appeal than photographs, but it was found impossible to give such accuracy as is essential owing to the great difficulty in preserving the exact colours of dead specimens and to the range of shades through which the adults pass during life.

The format of the book is original. for chapters are replaced by sectional headings, namely: Glossary of Scientific Terms; Pronunciation of Latin and Greek names; The Life History of the Dragonfly; Methods of Collecting and Preserving; Usual Time of First Appearance on the Wing; Keys to the Identification of Species arranged under (i) Principal Colours, and (ii) Structure and Pattern; Wings and Bodies of Dragonflies; Description of Species; Classification of the Group; and a Check List of the British Species.

The nomenclature given is the most recent, and an original list of popular names is added for the convenience of the amateur. The keys to the genera and species may appear formidable to the beginner, but a study will prove that they are easy to use in the separation of the British species of *Odontata*.

The 'distribution' paragraphs are unavoidably incomplete, but the stimulus given by the author to a study of this interesting group of insects should result in a completion of the records of indigenous species.

G. FOX WILSON.

"Practical Plant Breeding." By W. J. C. Lawrence. 8vo. 150 pp. (G. Allen & Unwin, London, 1937.) 5s. 6d.

This little book has been written to assist the gardener who desires to raise new plants. There is no certain short cut to obtain highly desirable new varieties; but a knowledge of the route to be followed and of indicators to be observed on the way are both necessary to save time and trouble. The value of a guide is thus undisputed.

The early chapters deal with the technique of plant breeding. The structure of the flower is considered in relation to pollination by natural and artificial methods. The various devices and apparatus used to prevent chance pollination, including emasculation, protection by paper bags, linen or other cloth cages, are briefly but adequately dealt with. It frequently occurs that cross-pollination may be precluded in Nature by a varietal difference in the time of pollen liberation, or receptivity of the stigmatic surfaces, of different varieties. Thus "late" and "early" strains infrequently intercross. Habitat races also often remain uncontaminated, and this permits with certain species the practice of "bunch breeding," whereby similar plants may be isolated from others and permitted to produce seed giving rise to seedlings very closely resembling their parents.

Subsequent chapters deal with the laws of heredity and the causal mechanism. The author, in close touch with the cytological investigations of his colleagues at Merton, presents a simple, lucid account, as free from technical terms as possible, of investigations dealing with the relationship between chromosomes, their genes and plant breeding. The practical man should appreciate this account; scattered throughout the text are many instances of concise information, neatly imparted, concerning a wide range of garden plants. Finally, the reader is shown something of the accomplishments of recent years, as well as of the earlier hybridists.

Whilst textbooks of genetics are already available, this book should directly assist the hybridist. It will prove useful to students, student gardeners, and many other readers who follow the described methods with care and who master the principles outlined.

M. A. H. TINCKER.

NOTES AND ABSTRACTS.

Anemone rupicola Cambess. By J. R. Sealy (*Bot. Mag.*, t. 9476; Feb. 1937). A perennial herb from the Himalaya from Chitral eastwards to N.W. Yunnan and Szechwan, up to 10 inches in height, with a single stem bearing one or sometimes two white flowers up to 3 inches in diameter, suffused with pale purple on the outsides of the sepals. Closely allied to *A. sylvestris*, figured in the *Bot. Mag.* at t. 54, but easily distinguished by its sessile involucre leaves, while those of *A. sylvestris* are petioled. A hardy plant easily propagated by seeds or division.—*M. S.*

Carmichaelia odorata Colenso. By B. L. Burtt (*Bot. Mag.*, t. 9479; Feb. 1937).—A much-branched shrub from New Zealand, up to 10 feet in height, bearing numerous racemes of small, papilionaceous, purplish-mauve flowers about $\frac{1}{2}$ inch wide. A plant for the cool greenhouse or sheltered positions in the open.—*M. S.*

China, Flora of [*Symbolae Sinicae*, VII, *Anthophyta*]. By H. Handel-Mazzetti and others (1,450 pp.; illus.; Vienna; 1929-36).—This work, now concluded as far as concerns flowering plants and ferns, is the most important contribution to our knowledge of the Chinese flora, so generous with good garden plants, since Sargent's *Plantae Wilsonianae* (1911-17), and covers a wider field, all of the herbaceous plants as well as trees and shrubs collected by the Vienna Academy of Sciences Expedition to Western China, 1914-18, being enumerated, as well as various plants of Forrest, Henry, Ward, Wilson and others. New species are described in detail; for others, many new localities and rectifications of nomenclature are noted. The author has studied type or authentic herbarium material of most of the previously described Chinese plants; hundreds of the names proposed, usually with inadequate or misleading descriptions, by Hector Léveillé, are here determined as synonyms. Of particular interest is the revision of *Primula* names (pp. 734-50), wherein it is recognized which names proposed by Balfour and W. W. Smith, which by Handel-Mazzetti, have priority and refer to the same species; incidentally the plant erroneously known in gardens and figured in *Bot. Mag.*, t. 7219, as *Primula Poissonii*, non Franch., is here called *P. planiflora* Forrest & Hand.-Mazzt. *Gentiana*, elaborated by Harry Smith of Upsala, yields an amazing number of new species, though probably few have any garden value; *Gentiana ampla* (akin to *G. Veitchiorum*), *G. oreodoxa* (akin to *G. sino-ornata* but smaller) and *G. coelestis* (akin to *G. sino-ornata* but with narrowly ovate or broadly lanceolate leaves) seem desirable. The descriptions are in Latin, the notes in German.—*W. T. S.*

Cotoneaster Cooperi Marquand var. *microcarpa* Marquand var. nov. By C. V. B. Marquand (*Bot. Mag.*, t. 9478; Feb. 1937).—A variety of *C. Cooperi* native in Bhutan, differing from the typical *C. Cooperi* only in its bright red berries, compared to the bluish-black fruits of the type.—*M. S.*

Epidendrum coriifolium Lindley. By V. S. Summerhayes (*Bot. Mag.*, t. 9477; Feb. 1937).—An epiphytic rock dweller from Guatemala southwards along the mountains to Peru, up to 12 inches in height, with a fleshy inflorescence of up to fifteen small fleshy, greenish, reddish or purple flowers. A plant for the intermediate Orchid house.—*M. S.*

Rhododendron Weyrichii Maxim. By J. Hutchinson (*Bot. Mag.*, t. 9475; Feb. 1937).—An Azalea from Southern Japan and Quelpaert Island (Korea), up to 15 feet high, with bright red funnel-shaped flowers dark-spotted within at the back of the tube, opening before or with the leaves. It differs from its nearest ally, the very variable *R. reticulatum* (see *Bot. Mag.*, t. 6972, *R. rhombicum*; and t. 7681, *R. dilatatum*), in its flower colour, *R. reticulatum* always having rose or white flowers. Fairly hardy in sheltered positions in Great Britain.—*M. S.*

ROYAL HORTICULTURAL SOCIETY.

REPORT OF THE COUNCIL

FOR THE ONE HUNDRED AND THIRTY-THIRD ANNUAL MEETING OF
THE SOCIETY, TO BE HELD IN THE LECTURE ROOM OF THE NEW
HALL, GREYCOAT STREET, WESTMINSTER, AT 3 P.M. ON TUESDAY,
FEBRUARY 23, 1937.

The Society's Progress.—The expansion of the Society continues, and may be regarded as a sign of the usefulness and popularity of its work. The total number of Fellows and Associates of the Society on November 8, 1935, was 31,648, and the figure has now grown to 33,447, or a net increase of 1,799 as against a net increase of 1,768 in 1935, the details being as follows :

LOSS BY DEATH IN 1936.		ELECTIONS IN 1936.	
Honorary Fellows	2	Associates of Honour	4
Associates of Honour	3	Life Fellows	25
Life Fellows	18	4 Guinea Fellows	21
4 Guinea Fellows	3	2 " "	1,285
2 " "	256	1 " "	2,520
1 " "	201	Associates	138
Associates	2	Affiliated Societies	51
	<hr/> 485		
LOSS BY RESIGNATION.		Deaths and Resignations	4,044
4 Guinea Fellows	7		2,245
2 " "	635		
1 " "	1,007	NET INCREASE	1,799
Associates	74		
Affiliated Societies	37	Total on November 8,	
	<hr/> 1,760	1935	31,648
		Total on November 10,	
		1936	33,447

The year has not passed without its loss of notable people associated with Horticulture and with the Society's work. Among them are Lord Wakehurst, V.M.H., a most distinguished past President and Vice-President, in memory of whom a special memoir has been published in the JOURNAL; Mr. G. H. Engleheart, V.M.H., the pioneer raiser of Daffodils, and Mr. H. B. May, V.M.H., an Honorary Fellow.

for many years a Member of Council and Chairman of the Floral Committee.

From among the Associates of Honour there have passed away Mr. P. Blair, for some time member of the Floral Committee, Mr. W. B. Gingell, member of the Fruit and Vegetable Committee, who was associated with the London Parks, and Mr. J. V. Macdonald, a noted head gardener. From among our Honorary Fellows there have died Count E. Silva Tarouca, whose gardens at Schloss Pruhonitz, near Prague, are world-famed. There must also be recorded the deaths of Dr. R. V. Favell and Mr. A. J. Jones, members of the Narcissus and Tulip Committee; Mr. W. Poupart, V.M.H., Vice-Chairman of the Fruit and Vegetable Committee and member of the Narcissus and Tulip Committee; Mr. A. Poupart, a member of the Fruit and Vegetable Committee; Mr. A. C. Atchley of Athens, a Correspondent of the Lily Committee; Mr. Louis L. Sander, a member of the famous Orchid firm; Mr. Samuel Ryder of the well-known seed firm; and Mr. Neville Cooper, an amateur gardener particularly interested in Conifers and rock plants.

P. D. Williams Memorial.—A medal, which will be struck in gold, silver, and bronze, bearing his portrait, has been founded in memory of Mr. P. D. Williams of Lanarth, who died on November 6, 1935. The necessary funds have been subscribed by his friends, and by those interested in Mr. Williams's work with Daffodils and Rhododendrons. It has been decided that the medal shall be offered in connexion with Daffodils and Rhododendrons in alternate years. In 1937 three medals will be offered for award in a special class at the Daffodil Show. The Council have also presented to the National Daffodil Society of New Zealand, the Royal Horticultural Society of Victoria, Australia, and the Amateurs' Horticultural Society of Hobart, Tasmania, similar medals for presentation in 1937 in view of the interest taken in those countries in the cultivation and raising of new Daffodils.

Fortnightly Meetings and Shows.—The Fortnightly Meetings and Shows at the Halls were well attended, and the Society's most cordial thanks are due to the nurserymen who staged the attractive exhibits on these occasions. The Calendar for 1937 has been arranged so that a greater number of the kindred societies' shows will coincide with fortnightly meetings, both Halls being used. It has been decided to open the Shows at 12 noon instead of at 1 o'clock as heretofore.

The Daffodil Show.—The Daffodil Show was held on Thursday and Friday, April 16 and 17, and proved one of the most successful Shows of the series. An account of it will be found in the Daffodil Year Book of 1936. The Daffodil Show of 1937 will be held on Thursday and Friday, April 15 and 16, and on this occasion the first awards of the P. D. Williams Medals will be made. The particulars of the competition will be found in the schedule of the Show.

Early Market Produce Show.—The fifth of a series of these Shows was held in the Old Hall on Thursday and Friday, April 16 and 17. Once again the value of such Shows was demonstrated by the remarkable exhibits of early fruits, vegetables and flowers. On Thursday and Friday, April 15 and 16, 1937, a similar Show will be held, and on the 15th Dr. G. E. Friend has promised to lecture on "Vegetables as an article of diet."

Alpine Plant Conference and Exhibition.—A conference on Alpine Plants and an Exhibition were held in co-operation with the Alpine Garden Society on Tuesday, Wednesday and Thursday, May 5, 6 and 7. The Conference was opened in the presence of a large audience by the President of the Society, who was supported by the Viscountess Byng of Vimy, the President of the Alpine Garden Society. A number of distinguished visitors from overseas attended the Conference, contributing papers and taking part in the proceedings. The Council desire to express their thanks to all those who helped to make the Conference and Exhibition a success, whether by reading papers, by taking part in the discussions, or exhibiting, or by offering hospitality and opening their gardens to the members of the Conference. The Report of this Conference has been published by the Society under the title of "Rock Gardens and Rock Plants."

The Chelsea Show.—The Chelsea Show was held on Wednesday, Thursday and Friday, May 20, 21 and 22. His Majesty King Edward VIII, Her Majesty Queen Mary, the Duke and Duchess of York, the Duke of Kent and other members of the Royal Family honoured the Society by visiting the Show. The weather was rather cool and chilly and the attendance was, therefore, not quite so large as in 1935. The attendance in the early hours between 8 and 10 in the mornings was, however, better than usual. A noticeable feature of the Show was the increase in the number of rock gardens, a result perhaps of the holding of the Conference on Alpine Plants so shortly before. The Chelsea Show in 1937 will be held on Wednesday, Thursday and Friday, May 26, 27 and 28. In honour of the Coronation Year, a special exhibit of the plants of the Colonies and Dominions will be staged, and the Council desire to acknowledge the promises of assistance they have received from the Secretaries of State for the Colonies and Dominions, from the Colonial and Dominion Governments, from the Royal Botanic Gardens, and from many owners of gardens and nurserymen.

The Amateurs' Flower Show.—The twelfth Amateurs' Flower Show was held on Tuesday, June 30. In view of the fact that the interest in such shows is necessarily confined to a somewhat limited number of Fellows, it has been decided to discontinue the Show as such, but to include certain competitive classes for Amateurs at the appropriate Fortnightly Shows; for instance, in 1937 competitive classes

iv PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

for shrubs will be held on Tuesday and Wednesday, June 8 and 9; classes for Lilies on Tuesday and Wednesday, July 6 and 7; classes for hardy flowers on Tuesday and Wednesday, July 20 and 21, and a class for Cacti and succulents on Tuesday, September 14. For Orchids, there will be competitions for *Cypripediums* on January 12, *Cymbidiums* on March 23, and *Odontoglossums* on April 20. Entry forms are obtainable from the Secretary, and further announcements on the subject will be made in the JOURNAL.

The Autumn Show.—No Autumn Show was held during the year, but the Council are glad to be able to state that it has proved possible to make arrangements to hold an Autumn Show in the National Hall of Olympia in 1937 on Wednesday, Thursday and Friday, September 29, 30 and October 1.

The Lily Group.—During the year the Lily Group held five meetings, and reports of these have been published in the Lily Year Book for 1936. A number of members of this Group were most kindly permitted to visit the gardens of Lord Swaythling at Townhill Park, Southampton, and of the Rev. Professor E. S. Lyttel at Nyewoods, Chilworth, Southampton. Arrangements have been made for five meetings of the Group in 1937.

The Iris Group.—During the year it was decided to form an Iris Group, in co-operation with the Iris Society, on similar lines to the Lily Group. Two meetings were held, and two meetings have been arranged for 1937.

Fellows who are desirous of taking part in the meetings of these two Groups are asked to notify the Secretary of the Society. No additional subscriptions are required.

Wisley : The Garden.—The increased summer rainfall of the year has benefited the gardens at Wisley, and many of the plants that suffered from the drought of the previous two years have recovered. The growth of the trees and shrubs, and especially of the *Rhododendrons*, has been above the average. The standard collections have been maintained, and, in addition, a new standard collection of Border Carnations has been planted.

In order that the Fellows might have increased opportunities of seeing the autumn-coloured foliage and the fruits, the Sunday opening of the Gardens was continued during October.

A considerable number of alterations have been made in the Gardens in the last few years, and the Council desire to express their appreciation, both of the way that the Director, Mr. Harrow, has carried out this work, and also of the high standard of cultivation that obtains under his care.

Battleston Hill.—The purchase of Battleston Hill, a lovely piece of land with fine pine and other trees, situated between the Portsmouth

Road and the gardens, has now been completed. Negotiations are also in progress for the acquisition of the land between the gardens and the Portsmouth Road, consisting of 4 acres of woodland and 14 acres of open land. This purchase, together with that of the Battleston property, will protect the amenities of the Society's gardens for the future.

Alterations.—The Fruit Room to the east of the Floral Trial Grounds has been extended so as to provide for the better storage of late Apples and Pears. In the building a large collection of named varieties of Apples and Pears is available for inspection in the autumn.

In order to provide for additional accommodation for the cultivation of the White Fly Parasite, the remaining portion of the greenhouse used by the scientific staff has been devoted to this purpose, and a new greenhouse has been provided for other scientific work.

A house is being built on the Fruit Trial Grounds for the Assistant for Fruit Experiments so that he may be able to reside near his work.

For the purpose of training boys interested in Horticulture, the house formerly occupied by the Superintendent of the Fruit and Vegetable Department is being made into a hostel, and the dining-room and kitchen arrangements of the existing bothy have been altered to provide the extra accommodation that will be required.

Visitors.—On May 21 Her Majesty Queen Mary graciously honoured the Society by visiting the Gardens at Wisley.

During 1936 more than a thousand visitors took advantage of the possibility of gaining admission to the Gardens by the payment of the fee charged to non-members. Members of horticultural and allied societies continue to visit the Gardens in increasing numbers.

Flower and Vegetable Trials.—The Flower and Vegetable Trials carried out during 1936, besides those in connexion with the standard collections, comprised trials of Godetias, Sidalceas, Schizanthus, Cornflowers and Wallflowers, and Early Peas, Dwarf and Climbing French Beans, and Carrots.

Joint Commercial Fruit Trials.—New varieties have been added to the plants grown for trial, and others are being propagated as usual for extended tests at the sub-stations.

A new sub-station is being established in Essex.

The late frosts experienced during the months of April and May ruined the crops of Gooseberries and Black Currants, but the crop of Raspberries was well above the average.

The Apple and Pear yields have been good, and many new varieties, some of which have borne fruit for the first time, attracted considerable attention from the large number of growers and Fellows who visited the Trials.

Pollination experiments and the recording of the vegetative characters of all kinds of fruit is being continued.

An area of nearly 40 acres is now occupied by these trials.

Demonstrations of Practical Garden Operations.—Six demonstrations were carried out at Wisley during 1936, and Fellows and their friends attended in considerable numbers.

During 1937 these demonstrations will be repeated as follows :

Mar. 10, 11.—Seed Sowing, Indoors and Outdoors.

„ 17, 18.—Rose Pruning.

Apr. 7, 8.—Spring Spraying of Fruit Trees, and Pruning of Shrubs.

July 21, 22.—Summer Pruning of Fruit Trees and Shrubs.

Aug. 25, 26.—Vegetative Propagation of Plants.

Nov. 10, 11.—Planting of Fruit Trees and Roses.

Dec. 8, 9.—Pruning of Fruit Trees.

The Wisley Laboratories : Investigations.—Scientific Research has been continued on horticultural problems of interest to Fellows. The Keeper of the Laboratory has conducted successful experiments on the application of growth-promoting substances to plant cuttings which it is desired to strike. Continuing his observations of new pests, the Entomologist has this year observed the occurrence of a Leaf Hopper of American origin on Rhododendrons. The Mycologist has continued his genetical search for a strain of *Antirrhinum* immune to the Rust disease. A disease of Wallflowers is under investigation. A survey has been made by the Botanist, by questionnaire, visits to nurseries, and other methods, of the “dying back” of Clematis. During the year twelve reports of investigations have been published in the Society's JOURNAL and Year Books. Members of the laboratory staff have read papers before conferences and meetings of scientific societies, the Fellows, and others interested in horticulture and applied science.

Advisory Services.—The advisory services offered to Fellows and others continue to be a prominent feature of the Laboratory work. Increased numbers of inquiries have been made, both at the Society's Shows at which scientific exhibits from Wisley have been staged, and by callers at the Laboratory.

White Fly Parasite.—The White Fly Parasite has been distributed from Wisley ; and, despite the provision of further space for its cultivation, the demand again exceeded the available supply.

School of Horticulture.—During the year seven present or past Wisley Student Gardeners have gained the National Diploma in Horticulture, and two have passed the Preliminary Examination. Once again the Council are able to report that all the Student Gardeners, on leaving Wisley, have been successful in obtaining posts.

Trials.—During the year a trial of spray spreaders was conducted by the Entomologist.

Visiting Conferences.—The South-Eastern Province and Wye Horticultural and Agricultural Conference held their summer meeting at Wisley, when papers were read to the members by the Laboratory staff. The Council entertained the Association of Applied Biologists for their annual summer meeting held at Wisley, when demonstrations of the research in progress were given by the staff.

Lectures at the Hall.—The Council record their gratitude to the lecturers who have assisted at the Fortnightly Meetings and especially to Dr. Redcliffe N. Salaman, Director of the Potato Virus Research Station, Cambridge, for his Masters Memorial Lectures on "The Potato in its Early Home and its Introduction into Europe." Dr. E. J. Salisbury will deliver the Masters Memorial Lectures for 1937 on Tuesday, March 9, and Tuesday, March 23, when he will speak on "The Plant and its Water Supply."

Deputations.—The Society was represented by the President at the Centenary Celebrations of the Botanical Society of Edinburgh on July 1, and by Dr. A. B. Rendle on the occasion of the Centenary Celebrations of the Royal Linnean Society of Brussels on May 16.

The Society's Publications.—The following publications have appeared during the year: the "Lily Year Book for 1936"; the "Daffodil Year Book for 1936"; and "Rock Gardens and Rock Plants," being the Report of the Conference held by the Society in co-operation with the Alpine Garden Society.

The Index to all the volumes of the JOURNAL is well forward in the press and it is hoped that it will be published in the spring of 1937.

Curtis's Botanical Magazine, Volume 147 of the year 1921, the cost of which was generously provided by the late Mr. Reginald Cory, is now well in hand and should be available very shortly.

The Supplement to the Index Londinensis, an index to illustrations of Flowering Plants, Ferns, etc., covering the fifteen years from 1921 to 1935, is now being prepared for the press.

It was announced last year that the Society was undertaking the publication of a Horticultural Colour Chart, particulars of which have appeared in the JOURNAL. The work is making good progress and it is hoped that the first volume will be published during 1937.

The Lindley Library.—The late Mr. Reginald Cory's munificent bequest of horticultural and botanical books has been received and partly incorporated in the Lindley Library. It is proposed to publish in the JOURNAL a full account of this bequest with a list of the books.

Among the books and paintings which have been added to the Library are the following, those marked with an asterisk being from the Cory Bequest :

H. W. Clinton-Baker and A. Bruce Jackson, "Illustrations of Conifers"; R. Dodoens, "Cruydt-boeck"; C. Linnaeus, "Amaenitates academicae . . . cur. J. C. D. Schreber" (10 vols.); Northern Nutgrowers Association, "Report of Proceedings, 1910-34" (25 vols.); P. O. Reveil and others, "Le règne végétal" (17 vols.); W. Rytz, "Pflanzenaquarelle des Hans Weiditz aus dem Jahre 1529"; P. Stephens and others, "Catalogus horti botanici Oxoniensis"; T. Terasaki, "Nippon shokubutsu Zufu"; S. Vaillant, "Botanicon Parisiense . . . enrichi de figures par C. Aubriet"; Original water-colour drawings for W. Baxter, "British Phanerogamous Botany" (3 vols.)*; N. de Bonnefons, "Le jardinier françois," 2nd ed.*; F. Dreves and F. G. Hayne, "Botanisches Bilderbuch" (4 vols.)*; "Le Jardin," 18-17e année (17 vols.); H. F. Jaubert and E. Spach, "Illustrationes plantarum Orientalium" (5 vols.); J. H. Jaume St.-Hilaire, "Exposition des familles naturelles" *; J. S. Kerner, "Le raisin" *; J. S. Kerner, "Hortus sempervirens" (22 vols.)*; J. Kraft, "Pomona Austriaca, ou arbres fruitiers" (2 vols.)*; K. S. Kunth, "Mimoses et autres Légumineuses du Nouveau Continent" *; J. Liboschitz and K. B. Trinius, "Flore des environs de St.-Petersbourg et de Moscou" *; A. Michaux, "Flora Boreali-Americana" (2 vols.)*; A. M. F. J. Palisot de Beauvois, "Flore d'Oware et de Benin" (2 vols.)*; A. Poiteau and P. J. F. Turpin, "Flora Parisiensis" *; J. L. M. Poiret and P. J. F. Turpin, "Leçons de flore . . . suivi d'une iconographie végétale," with original paintings by Turpin (3 vols.)*; J. D. Reiter and G. F. Abel, "Abbildung der hundert deutschen wilden Halz-Arten" *; Dawson Turner, "Muscologia Hibernicae spicilegium" (marginally illustrated by Sir Wm. J. Hooker)*; F. B. Vietz, "Icones plantarum med.—oec.—technol." (11 vols.)*; P. J. Redouté, "Choix des plus belles fleurs" *; Proof copies of illustrations to "Loddiges Botanical Cabinet" (20 vols.).*

The Society's Examinations.—The results of the examinations in Horticulture for 1936 were more satisfactory than for the previous year.

The National Diploma in Horticulture has been awarded to 20 candidates, as follows :

16 candidates in Section 1.	General Horticulture.
2 " "	2. Hardy Fruit Growing.
1 candidate "	6. Gardening in Public Parks.
1 " "	7. Horticultural Inspection.

Twenty-six candidates passed the Preliminary Examination for the Diploma, and are eligible for the Final Examination when they have completed six years practical gardening.

In the General Examination certificates were awarded to 288 Senior, and 156 Junior candidates. Two hundred and fifty-three candidates passed the Teachers' Preliminary Examination in School and Cottage

Gardening, and 12 were awarded the Advanced Certificate—one candidate gaining a "Pass with Honours."

The results of the spring examination for the British Floral Art Diploma were not so satisfactory. Of the 37 candidates who entered, only 4 satisfied the Examiners and were awarded the Diploma. This examination is now becoming more widely known, and candidates from the provinces are presenting themselves for the examination.

Expeditions.—The Society has subscribed to further expeditions in search of new plants, namely: that organized by the New York Botanical Garden in the Rocky Mountains, some seeds from which have now been received; that organized by Mr. Will Ingwersen in the Rocky Mountains, British Columbia and Vancouver Island, plants and seeds of which have been received at Wisley; that arranged in Western China under the guidance of Professor H. H. Hu, Director of the Fan Memorial Institute at Peiping.

The Victoria Medal of Honour.—The Victoria Medal of Honour has been awarded to Colonel Stephenson R. Clarke, C.B., for his work in the introduction and the growing of rare and uncommon plants; to Mr. J. Comber, for his long service in horticulture; and to Mr. F. A. Secrett, F.L.S., for his work in the advancement of commercial Horticulture.

The Associates of Honour.—The Associateship of Honour has been conferred on Mr. Wm. Bailey, Head Gardener at Crooksbury House, Farnham; Mr. T. W. Bolas, Head Gardener at Mount Stewart, Newtownards, co. Down; Mr. F. G. Preston, Curator of the University Botanic Garden, Cambridge; and Mr. A. B. Wadds, Head Gardener at Englefield House, Reading.

The Lawrence Medal.—The Lawrence Medal for the best exhibit staged at the Society's Shows during the year has been awarded to Messrs. John Waterer, Sons & Crisp, Ltd., for their exhibit of Japanese Cherries staged on March 24, 1936.

The Holford Medal.—The Holford Medal for the best exhibit of plants and/or flowers (fruit and vegetables excluded) shown by an amateur during the year in the Halls of the Society has been awarded to Mr. J. Pierpont Morgan for his exhibit of Begonias, Gesneria hybrids and Foliage Plants staged on November 10, 1936.

The Veitch Memorial Medals.—Awards have been made as follows: A Gold Medal to Sir Arthur Hill, K.C.M.G., V.M.H., for his services to Horticulture; a Gold Medal for Mr. R. W. Wallace, V.M.H., for his services to Horticulture; and a Silver Medal and £25 to Mr. R. L. Harrow, V.M.H., for his services to Horticulture.

The Sander Medal.—The Sander Medal has been awarded to the Director of the Royal Botanic Gardens, Kew, for *Beloperone guttata*,

shown on September 29, 1936, which was considered to be the best new greenhouse plant of general utility shown to the Society in the course of the year.

The George Moore Medal.—The George Moore Medal has been awarded to Mr. M. L. Wells for *Cypripedium* 'Kay-Kay' var. 'Sunny,' shown on November 24, 1936, which was considered to be the best new *Cypripedium* shown to the Society in the course of the year.

The Williams Memorial Medals.—The Williams Memorial Medals for the best group of plants and/or cut blooms of one genus (fruit and vegetables excepted) which show excellence in cultivation exhibited during the year have been awarded to Messrs. Charlesworth & Co., Ltd., for their exhibit of *Odontiodas* staged on March 10, 1936, and to Mr. J. L. Richardson, for his exhibit of Daffodils staged on April 16, 1936.

The Reginald Cory Memorial Cup.—The Reginald Cory Memorial Cup for the raiser of the best new hardy plant of garden origin shown to the Society in the course of the year, has been awarded to Mr. A. Harley for his *Gentiana* 'Devonhall,' shown on September 1, 1936.

The Loder Rhododendron Cup.—The Loder Rhododendron Cup has been awarded to Mr. E. J. P. Magor in recognition of his introduction of many interesting Rhododendron hybrids and other work in connexion with Rhododendrons.

The Sherwood Cup.—The Sherwood Cup for the most meritorious exhibit at the Chelsea Meeting was awarded to Messrs. R. Bolton & Son for their exhibit of Sweet Peas.

Gifts to the Society.—The Council wish to convey their cordial thanks to many Fellows and friends of the Society for gifts of plants, seeds and books; to the Ministry of Agriculture and Fisheries and to the British Glasshouse Produce Marketing Association for their gifts of prizes in connexion with the Early Market Produce Show for 1937, and to the Orchid Trade for the presentation of trophies for the Orchid competitions for amateurs.

The Council also desire to record their gratitude to Mr. E. A. Bowles for his gift of the original drawings of his Handbook of Narcissus, and to Major F. C. Stern for a further gift of slides of Irises and of Forrest's and other Chinese plants and shrubs grown at Edinburgh and in his own garden, and to the Iris Society for their gift of slides.

Retiring Members of Council.—The Council desire to express the Society's appreciation of, and warmest thanks for, the valuable services rendered during their periods of office by the retiring Members, General Sir John Du Cane, Mr. C. T. Musgrave and Mr. W. R. Oldham. They are gratified to know that the help and advice of these gentlemen will still be at the service of the Society and of the Committees of which they are members.

The Press.—The Council take this occasion once more to record their warm appreciation of the assistance rendered to the Society by the Press, and of the goodwill shown by its representatives.

Committees, Judges and Examiners.—The Society is deeply grateful to the members of the various Committees, to the Judges and to the Examiners who gave so much of their time to the work of the Society and who have contributed so largely to its success.

Staff.—The Council greatly appreciate the loyal and efficient work of their Secretary and staff both at Vincent Square and at the Society's Gardens at Wisley.

Signed on behalf of the Council,

ABERCONWAY,
President.

December 31, 1936.

Dr.

ANNUAL REVENUE & EXPENDITURE ACCOUNT

	£	s.	d.	£	s.	d.
To LONDON—						
ESTABLISHMENT EXPENSES LESS ALLOCATIONS—						
Rent, Rates and Taxes	3,160	12	4			
Salaries and Wages	7,912	3	0			
Other Establishment Expenses, including Light, Fuel, Stationery, Professional Fees, and Renewals	4,888	12	8			
				15,961	8	0
„ WISLEY—						
Net Expenditure for Year, as per separate Account				15,009	10	2
„ PRINTING AND POSTAGE OF JOURNAL AND OTHER PUBLICATIONS	9,192	6	7			
Less Sales and Advertisements	3,140	13	11			
				6,051	12	8
„ STAFF PENSIONS	1,156	10	0			
Less Contributions by Staff, as per Scheme	487	13	0			
				668	17	0
„ MEETINGS—						
Expenses Labour and Overheads of Special and Other Meetings	3,724	19	11			
Less Receipts	465	1	0			
				3,259	18	11
Spring Meeting : Expenses Labour and Overheads	7,995	8	0			
Receipts	8,105	18	4			
„ CUPS AND MEDALS				3,149	8	7
				369	7	6
„ GARDEN INSPECTIONS—						
Expenditure less Receipts				29	8	3
„ CONTRIBUTIONS TO LINDLEY LIBRARY, as per Trust Account—						
Purchase of Books	514	4	6			
Salaries, etc.	523	7	10			
				1,037	12	4
„ SPECIAL EXPENDITURE—						
E. K. Balls Expedition	25	0	0			
W. Ingwersen Expedition	25	0	0			
Chinese Expedition	40	0	0			
New York Botanic Garden Expedition	9	19	5			
Donation, Royal Geographical Society	10	0	0			
„ British Colour Council	5	5	0			
„ London Children's Gardens	10	10	0			
„ Gardeners' Royal Benevolent Inst.	52	10	0			
„ Royal Gardeners' Orphan Fund	21	0	0			
„ National Anti-Grey Squirrel Cam- paign	2	2	0			
„ National Auricula and Primula Society	10	0	0			
„ Potato Virus Research Station	100	0	0			
„ National Memorial to King George V	105	0	0			
„ Roads Beautifying Association	50	0	0			
„ Central Committee for Allotments for Unemployed	21	0	0			
Pritzel Revision (Index Londinensis)	464	5	11			
Alpine Conference	101	11	6			
				1,053	3	10
„ BOTANICAL MAGAZINE	671	18	10			
Add Work in Advance	166	5	0			
				838	3	10
„ EXAMINATIONS IN HORTICULTURE—						
Expenses	669	6	3			
Less Fees	605	10	6			
				63	15	9
Carried forward				£44,232	7	11

FOR THE YEAR ENDED 31st DECEMBER, 1938.

Cr.

	£	s.	d.	£	s.	d.
By ANNUAL SUBSCRIPTIONS				49,351	13	7
„ DIVIDENDS AND INTEREST	1,028	14	5			
„ Do. Do. DAVIS TRUST	46	17	6			
„ DEPOSIT INTEREST	137	4	0			
				<hr/>	1,212	15 11
„ HALL LETTINGS, Gross				5,242	5	0
„ LIFE COMPOSITIONS— Being amounts paid by Fellows who have died during the year				336	0	0
„ RENT OF FREEHOLD PROPERTY (Wisley)				282	7	7

Carried forward £56,425 2 1

Dr.

ANNUAL REVENUE & EXPENDITURE ACCOUNT

	£	s.	d.	£	s.	d.	£	s.	d.	
Brought forward .	.	.	.	.	.	.	44,232	7	11
To GENERAL SCHOLARSHIPS . . . . .	.	.	.	.	.	.	91	18	7
Less Contributions from the Knott Scholarship Fund	22	10	0							
Less Contributions from the Wor- shipful Company of Gardeners	40	0	0							
							62	10	0	
								29	8	7
„ OLD AND NEW HALLS SINKING FUND APPRO- PRIATION . . . . .	.	.	.	.	.	.	3,366	0	0
„ RESTAURANTS—										
Deficit after charging Proportion of Overhead Expenses . . . . .	.	.	.	.	.	.	603	3	7
„ BALANCE, being Excess of Revenue over Expen- diture, carried to Balance Sheet							8,194	2	0	
							£56,425	2	1	

FOR YEAR ENDED 31st DECEMBER, 1936—continued.

Cr.

	£	s.	d.
Brought forward . . .	56,425	2	1

£56,425 2 1

ROYAL HORTICULTURAL SOCIETY

LIABILITIES.

	£	s.	d.	£	s.	d.
ACCUMULATED FUNDS ACCOUNT as at 31st December, 1935	239,981	0	1			
<i>Add</i> transferred from Revenue and Expenditure Account	10,018	19	11			
				250,000	0	0
LIFE COMPOSITIONS as at 31st December, 1935	14,532	0	0			
<i>Less</i> Fees paid by Fellows who have died during the year	336	0	0			
	14,196	0	0			
<i>Add</i> Life Compositions paid during the year	786	15	0			
				14,982	15	0
SUNDRY CREDITORS				4,566	11	8
SUBSCRIPTIONS IN ADVANCE				680	18	6
DEPRECIATION AND RENEWALS FUND				10,000	0	0
OLD AND NEW HALLS SINKING FUND	18,152	1	11			
Deducted <i>per Contra</i>	18,152	1	11			
WEATHER INSURANCE FUND				3,000	0	0
SUPPLEMENTARY PENSION FUND				3,766	0	4
RESERVE AGAINST DEPRECIATION OF INVESTMENTS as at 31st December, 1935	1,964	2	4			
Appreciation on Sale and Reinvestment of Securities	36	1	1			
	2,000	3	5			
<i>Less</i> transferred to General Reserve	2,000	3	5			
MEMORIAL AND OTHER TRUST FUNDS—						
Balances in the hands of the Society as per Separate Schedule				357	4	5
GENERAL RESERVE—						
Appreciation on Sale and Reinvestment of General Investments	185	14	5			
<i>Add</i> Amounts transferred from—						
Depreciation and Renewals Fund	37	18	5			
Weather Insurance Fund	246	10	10			
Reserve against Depreciation of Investments	2,000	3	5			
Revenue and Expenditure Account	18,996	14	1			
				21,467	1	2
REVENUE AND EXPENDITURE ACCOUNT—						
Balance as at 31st December, 1935	20,821	12	0			
<i>Add</i> Balance of Revenue and Expenditure Account, 31st December, 1936	8,194	2	0			
	29,015	14	0			
<i>Less</i> transferred to Accumulated Funds Account	10,018	19	11			
	18,996	14	1			
<i>Less</i> transferred to General Reserve	18,996	14	1			
				£308,820	11	1

I have audited the books from which the foregoing Accounts are compiled, and certify that they exhibit a true and correct statement of the position of the Society on the 31st December, 1936. In the total of Assets, £308,820 11s. 1d., are included Investments and Cash amounting in all to a total sum of £35,275 6s. 8d., representing Depreciation and other Funds.

BALANCE SHEET, 31st DECEMBER, 1936.

ASSETS.

	£	s.	d.	£	s.	d.
OLD HALL, OFFICES, RESTAURANT, LIBRARY, AND EQUIPMENT AT COST	77,642	0	0			
NEW HALL, RESTAURANT AND EQUIPMENT AT COST	167,706	2	10			
	245,348	2	10			
<i>Less Old and New Halls Sinking Fund per Contra</i>	18,152	1	11			
				227,196	0	11
OLD AND NEW HALLS SINKING FUND INVESTMENTS AT COST—						
As at 31st December, 1935	14,233	19	3			
Appreciation on Sale and Reinvestment	52	5	4			
Additions during the year	3,865	17	4			
				18,152	1	11
(Market value of Investments at 31st December, 1936, £18,093 14s. 8d.)						
FREEHOLD PROPERTY, WISLEY—						
As at 31st December, 1935	13,103	2	11			
Additions during the year	722	0	0			
	13,825	2	11			
<i>Less written off</i>	721	0	0			
				13,104	2	11
BOTANICAL MAGAZINE—						
Stock				100	0	0
DEPRECIATION AND RENEWALS FUND INVESTMENTS AT COST				10,000	0	0
(Appreciation on Sale and Reinvestment £37 18s. 5d. transferred to General Investments.)						
(Market value of Investments at 31st December, 1936, £10,466 10s. 6d.)						
WEATHER INSURANCE FUND INVESTMENTS AT COST				3,000	0	0
(Appreciation on Sale and Reinvestment £246 10s. 10d. transferred to General Investments.)						
(Market value of Investments at 31st December, 1936, £2,947 11s. 9d.)						
SUPPLEMENTARY PENSION FUND INVESTMENTS AT COST—						
As at 31st December, 1935	2,647	4	6			
Appreciation on Sale and Reinvestment	723	13	0			
Additions during the year	395	2	10			
				3,766	0	4
(Market value of Investments at 31st December, 1936, £3,702 1s. 4d.)						
DEPRECIATION OF INVESTMENTS FUND INVESTMENTS AT COST—						
As at 31st December, 1935	1,964	2	4			
Appreciation on Sale and Reinvestment	36	1	1			
	2,000	3	5			
<i>Less transferred to General Investments</i>	2,000	3	5			
GENERAL INVESTMENTS AT COST:						
As at 31st December, 1935	17,597	11	10			
Appreciation on Sale and Reinvestment	185	14	5			
Additions during the year	5,000	0	0			
	22,783	6	3			
<i>Add Amounts transferred from:—</i>						
Depreciation and Renewals Fund Investments	37	18	5			
Weather Insurance Fund Investments	246	10	10			
Depreciation of Investments Fund Investments	2,000	3	5			
				25,067	18	11
(Market value of Investments at 31st December, 1936, £24,832 11s. 2d.)						
WISLEY ADJUSTMENT ACCOUNT				278	18	2
SUNDRY DEBTORS AND PAYMENTS IN ADVANCE				3,936	13	10
CASH AT BANK AND IN HAND				4,218	14	1
				£308,820	11	1

J. S. FEATHER, F.C.A., Auditor
(HARPER, FEATHER & PATERSON, Chartered Accountants),
35 Great Tower Street, London, E.C. 3.

5th January, 1937

VOL. LXII.

ACCOUNT FOR YEAR ENDED 31st DECEMBER, 1936.**Cr.**

	£	s.	d.	£	s.	d.
By DIVIDENDS AND INTEREST				1,028	1	7

,, CONTRIBUTIONS TO FRUIT TRIALS, 1935-36—

Ministry of Agriculture	450	0	0			
Worshipful Company of Fruiterers	26	5	0			
National Farmers' Union	51	3	0			
				<hr/>	527	8 0

,, GARDEN—

Sales and Miscellaneous Receipts	742	2	1			
Prepaid Distribution, Postages and Packing Fees	888	5	2			
				<hr/>	1,630	7 3

„ BALANCE, carried down					12,270	17 9
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£15,456 14 7

,, BALANCE, being Net Expenditure for year, carried to the Annual Revenue and Expenditure Account

15,009 10 2

£15,009 10 2

WILEY GARDENS BALANCE

LIABILITIES.

	£	s.	d.
ACCUMULATED FUNDS ACCOUNT	35,870	7	8
VINCENT SQUARE ADJUSTMENT ACCOUNT	278	18	2
ENDOWMENT TRUST FUND	24,419	11	1
DEPRECIATION AND RENEWALS FUND	8,648	3	8

£69 217 0 7

SHUNT, 31st DECEMBER, 1936.

ASSETS.

	£	s.	d.	£	s.	d.
LABORATORY, DWELLING HOUSES, GLASS HOUSES, RANGES, ETC., AT COST				33,371	10	10
N.B.—The Hanbury Trust Estate is, under the Trust Deed, vested in the Society only so long as it is in a position to use it as an Experimental Garden. Accordingly the Expenditure thereon by the Society is an Asset only so long as the Gardens continue to be used by the Society.						
FUEL STOCK (valued by the Director)				26	5	0
PLANT, LIVE STOCK AND LOOSE EFFECTS (valued by the Director)—						
As at 31st December, 1935	2,147	7	3			
Add Purchases during the year	19	9	1			
	2,166	16	4			
Less Depreciation of Garden and Laboratory Effects	143	11	8			
				2,023	4	8
LIBRARY—						
As at 31st December, 1935	658	0	5			
Additions during the year	70	4	11			
				728	5	4
ENDOWMENT TRUST FUND INVESTMENTS AT COST						
As at 31st December, 1935	23,493	1	7			
Appreciation on Sale and Reinvestment	926	9	6			
				24,419	11	1
(Market value of Investments at 31st December, 1936, £25,137 14s. 7d.)						
DEPRECIATION AND RENEWALS FUND INVESTMENTS AT COST—						
As at 31st December, 1935	8,149	14	4			
Appreciation on Sale and Reinvestment	248	9	4			
Additions during the year	250	0	0			
				8,648	3	8
(Market value of Investments at 31st December, 1936, £9,921 1s. 8d.)						
				£69,217	0	7

I have audited the books from which the foregoing Accounts are compiled, and certify that they exhibit a true and correct statement of the position on the 31st December, 1936. In the total of Assets, £69,217 os. 7d., are included Investments, amounting to £33,067 14s. 9d., representing Endowment and Depreciation Funds which are not available for the general purposes of the Society.

J. S. FEATHER, F.C.A., *Auditor*
(HARPER, FEATHER & PATERSON, *Chartered Accountants*),
35 Great Tower Street, London, E.C. 3.

5th January, 1937.

ROYAL HORTICULTURAL SOCIETY—TRUST

	Amount of Fund represented by Investments at Cost.			Income Balance in hand 31st Dec., 1935.		
	£	s.	d.	£	s.	d.
1. ALFRED DAVIS TRUST FUND *	1,049	9	2			nil
2. WILLIAMS MEMORIAL FUND *	257	12	7	16	11	3
3. MASTERS MEMORIAL FUND *	342	17	0	125	15	10
4. NICHOLSON MEMORIAL FUND *	196	1	5			nil
5. SCHRÖDER PENSION FUND *	557	14	6	6	6	8
6. LINDLEY LIBRARY TRUST *	14,050	7	5 (a)			nil
7. SIR JAMES KNOTT TRUST *	600	0	0	84	13	3
8. VEITCH MEMORIAL TRUST FUND *	1,746	1	0	106	13	8
9. MOORE MEDAL TRUST *	190	10	6	9	0	11
10. SEWELL MEDAL TRUST FUND *	527	10	3	3		9
11. MRS. SHERMAN HOYT PRIZE FUND *	207	7	10	14	12	9
12. LORD RIDDELL TROPHY FUND *	222	12	11	3	1	6
13. DEDICATIONS VOLUME FUND (Botanical Magazine) *	207	8	5	9	10	8
14. THE COLMAN FUND *	1,153	0	0			nil
15. P. D. WILLIAMS FUND *	372	7	9			nil

* NOTE.—The above Funds have been increased by the appreciation on Sale and Reinvestment of certain securities during the year.

Notes on above Funds :

1. Bequeathed to the Society in 1870 for annual prizes or any other object the Council may determine.
2. Raised by donations in 1891 in memory of the late Mr. B. S. Williams towards the provision of prizes and medals.
3. Raised by donations in 1908 in memory of the late Dr. Masters towards the provision of one or more annual lectures.
4. Raised by donations in 1908 in memory of the late Mr. Geo. Nicholson to provide prizes for Wisley students.
5. Provided by the Society in memory of the late Baron Schröder to pay to the Gardeners' Royal Benevolent Institution for one pension.
6. The nucleus of the library is the fine collection of books and pamphlets which belonged to the late Dr. Lindley. It has since been added to by the books purchased by the Society and by the gifts of the late Mr. Reginald Cory and of private donors.
7. Presented to the Society in 1920 by the late Sir James Knott for the purpose of providing a scholarship tenable at Wisley.

FUND ACCOUNTS, 31st DECEMBER, 1936.

Dividends and Interest received during 1936.	Expenditure in 1936 in accordance with the Trust.	Income Balance in hands of R.H.S. 31st Dec., 1936.	
£ s. d.	£ s. d.	£ s. d.	
46 17 6	46 17 6	nil	(a) Investment . . * 1,509 10 2
9 3 1	10 5 10	15 8 6	Cost of Books pur- chased by the
20 0 0	23 10 0	122 5 10	Society up to
6 5 3	6 5 3	nil	31st Dec., 1935 12,026 12 9
20 0 0	20 0 0	6 6 8	Books purchased by the Society
570 5 0 (b)	570 5 0	nil	in 1936 . . . 514 4 6
25 3 0	22 10 0	87 6 3	
59 16 10	79 14 6	86 16 0	£14,050 7 5
7 16 6	9 17 0	7 0 5	(b) Includes contribution by the Society in 1936, £523 7s. 10d.
24 2 10	19 12 0	4 14 7	(c) Invested and added to Fund, includes proceeds of sales
10 8 1	8 10 0	16 10 10	in 1936, of £2.
6 2 1	6 11 0	2 12 7	(d) Invested and added to Fund.
7 3 7 (c)	16 14 3	nil	
35 5 3 (d)	35 5 3	nil	
8 2 9	nil	8 2 9	
Total as per Balance Sheet		£357 4 5	

8. Instituted in 1870 in commemoration of the late Mr. James Veitch for the encouragement of Horticulture. Fund vested in Society in 1922.

9. Presented to the Society in 1926 by the late Mr. G. F. Moore to provide a medal annually for the best new *Cypripedium* shown to the Society during the year.

10. Presented to the Society in 1928 by the late Mr. A. J. Sewell to provide medals for Rock Garden Plants.

11. Presented by Mrs. A. Sherman Hoyt in 1929 as a donation and funded by the Society to provide prizes for the encouragement of the growth of Cacti and Succulents.

12. Presented by the late Lord Riddell in 1931 to provide a trophy annually to be awarded for vegetables.

13. Proceeds of the sale of Curtis's Botanical Magazine Dedications, 1827-1927, presented in 1932 to the Society by the late Mr. William Cuthbertson, V.M.H., to be devoted to publications.

14. Presented to the Society in 1935 by Sir Jeremiah Colman, Bt., V.M.H., to be used for the improvement of flowers or fruit.

15. Raised in 1936 by donations to commemorate the late P. D. Williams and to encourage the cultivation and improvement of Daffodils and Rhododendrons.

ROYAL HORTICULTURAL SOCIETY—SCHEDULE

DEPRECIATION AND RENEWALS FUND, VINCENT SQUARE—	Nominal.			Cost.		
	£	s.	d.	£	s.	d.
Hertfordshire County Council, 3% Red. Stock, 1948-1953	1,107	7	0	1,076	9	8
Cornwall County Council, 3% Red. Stock, 1953-1963	1,107	7	0	1,056	8	8
Middlesex County Council, 3% Red. Stock, 1948-1953	830	10	3	799	6	3
Metropolitan Water Board, 3% B Stock, 1934-2003	2,110	11	5	1,979	9	7
Conversion Loan, 2½%, 1944-1949	2,768	7	5	2,580	16	11
Plymouth Corporation, 2½% Red. Stock, 1918-1958	225	9	4	111	6	5
Funding Loan, 2½%, 1956-1961	2,559	0	5	2,396	2	6
	10,708	12	10	10,000	0	0

OLD AND NEW HALLS SINKING FUND—

Hertfordshire County Council, 3% Red. Stock, 1948-1953	632	8	5	614	15	11
Cornwall County Council, 3% Red. Stock, 1953-1963	632	8	5	603	6	10
Middlesex County Council, 3% Red. Stock, 1948-1953	474	6	4	456	10	0
Metropolitan Water Board, 3% B Stock, 1934-2003	2,444	15	4	2,292	18	5
Conversion Loan, 2½%, 1944-1949	6,208	3	7	6,245	19	2
Metropolitan Water Board, 3% E Stock, 1953-1973	20	10	6	19	15	8
Funding Loan, 2½%, 1956-1961	8,335	3	0	7,918	15	11
	18,747	15	7	18,152	1	11

WEATHER INSURANCE FUND—

Funding Loan, 2½%, 1956-1961	3,203	18	0	3,000	0	0
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SUPPLEMENTARY PENSION FUND—

Funding Loan, 2½%, 1956-1961	4,023	19	9	3,766	0	4
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GENERAL INVESTMENTS—

Hertfordshire County Council, 3% Red. Stock 1948-1953	712	0	7	692	3	8
Cornwall County Council, 3% Red. Stock, 1953-1963	712	0	7	679	5	9
Middlesex County Council, 3% Red. Stock, 1948-1953	534	0	5	513	19	2
Metropolitan Water Board, 3% B Stock, 1934-2003	1,529	11	0	1,434	10	11
Conversion Loan, 2½%, 1944-1949	1,780	1	4	1,659	9	9
Funding Loan, 2½%, 1956-1961	21,287	4	8	20,088	9	8
	26,554	18	7	25,067	18	11

OF INVESTMENTS, 31st DECEMBER, 1938.

WISLEY ENDOWMENT TRUST FUND—	Nominal.			Cost.		
	£	s.	d.	£	s.	d.
Hertfordshire County Council, 3% Red. Stock, 1948-1953	1,041	4	3	1,012	3	11
Cornwall County Council, 3% Red. Stock, 1953-1963	1,041	4	3	993	6	9
Middlesex County Council, 3% Red. Stock, 1948-1953	780	18	2	751	11	5
Metropolitan Water Board, 3% B Stock, 1934-2003	2,083	4	1	1,953	16	4
Conversion Loan, 2½%, 1944-1949	2,824	2	3	2,654	14	1
Metropolitan Cons. 2½% Stock, 1919-1949	970	0	0	499	12	0
Plymouth Corporation, 6% Red. Stock, 1940-1950	30	9	4	29	6	4
Plymouth Corporation, 2½% Red. Stock, 1918-1958	400	0	0	197	1	0
Bristol Corporation, 2½% Red. Deb. Stock	600	0	0	278	18	6
Canadian Pacific, 4% Perp. Cons. Deb. Stock.	4,632	0	0	3,890	17	6
Buenos Ayres Gt. Southern Railway, 5% Non-Cum. Pref. Stock	2,500	0	0	2,825	0	0
Funding Loan, 2½%, 1956-1961	9,959	13	9	9,333	3	3
	26,862	16	1	24,419	11	1

DEPRECIATION AND RENEWALS FUND, WISLEY—

Hertfordshire County Council, 3% Red. Stock, 1948-1953	506	19	9	492	17	2
Cornwall County Council, 3% Red. Stock, 1953-1963	506	19	9	483	13	7
Middlesex County Council, 3% Red. Stock, 1948-1953	380	4	10	365	19	2
Metropolitan Water Board, 3% B Stock, 1934-2003	1,287	1	1	1,207	2	3
Conversion Loan, 2½%, 1944-1949	1,267	9	5	1,181	12	4
Metropolitan Consolidated 2½% Stock, 1919-1949	1,287	9	2	662	19	3
Plymouth Corporation, 2½% Red. Stock, 1918-1958	288	8	10	142	1	0
Plymouth Corporation, 6% Red. Stock, 1940-1950	159	18	4	151	12	4
Bristol Corporation, 2½% Red. Deb. Stock	795	14	6	369	15	3
Funding Loan, 2½%, 1956-1961	3,829	4	11	3,590	11	4
	10,309	10	7	8,648	3	8

ALFRED DAVIS TRUST FUND—

Metropolitan Consolidated, 2½% Stock, 1919-1949	610	0	0	314	4	0
Plymouth Corporation, 2½% Red. Stock, 1918-1958	200	0	0	98	10	6
Plymouth Corporation, 6% Red. Stock, 1940-1950	32	7	4	31	2	3
Bristol Corporation, 2½% Red. Deb. Stock	400	0	0	186	3	6
Funding Loan, 2½%, 1956-1961	447	19	6	419	8	11
	1,690	6	10	1,049	9	2

SCHEDULE OF INVESTMENTS, 31st DECEMBER, 1966.

	Nominal.			Cost.		
	£	s.	d.	£	s.	d.
WILLIAMS MEMORIAL FUND—						
East Indian Railway £7 Annuity, Class "B," 1953	168	0	0	168	0	0
Funding Loan, 2½%, 1956-1961	56	6	7	52	15	1
Metropolitan Water Board, 3% B Stock, 1934-2003	39	6	5	36	17	6
	<u>263 13 0</u>			<u>257 12 7</u>		
MASTERS MEMORIAL FUND—						
L.M.S. Railway, 4% Preference Stock	250	0	0	290	13	6
" " 4% Guaranteed Stock	250	0	0	252	3	6
	<u>500 0 0</u>			<u>542 17 0</u>		
NICHOLSON MEMORIAL FUND—						
Metropolitan Water Board, 3% B Stock, 1934-2003	209	0	11	196	1	5
SCHRÖDER PENSION FUND—						
Great Western Railway, 4% Deb. Stock	500	0	0	557	14	6
LINDLEY LIBRARY TRUST FUND—						
L.M.S. Railway, 4% Pref. Stock	1,137	0	0	1,458	15	7
Funding Loan, 2½%, 1956-1961	54	3	7	50	14	7
	<u>1,191 3 7</u>			<u>1,509 10 2</u>		
SIR JAMES KNOTT TRUST FUND—						
Agricultural Mortgage Corporation, Ltd., 4½% Deb. Stock	558	19	5	600	0	0
VEITCH MEMORIAL TRUST FUND—						
Government of Australia 3½% Reg. Stock, 1954-1959	1,354	0	1	1,354	0	1
Funding Loan, 2½%, 1956-1961	418	14	0	392	0	11
	<u>1,772 14 1</u>			<u>1,746 1 0</u>		
MOORE MEDAL TRUST FUND—						
Agricultural Mortgage Corporation, Ltd., 4½% Deb. Stock	173	19	8	190	10	6
SEWELL MEDAL TRUST FUND—						
Conversion Loan, 5%, 1944-1964	401	5	7	400	0	0
Metropolitan Water Board, 3% B Stock, 1934-2003	135	19	2	127	10	3
	<u>537 4 9</u>			<u>527 10 3</u>		
MRS. SHERMAN HOYT PRIZE FUND—						
Conversion Loan, 5%, 1944-1964	208	1	2	207	7	10
LORD RIDDELL TROPHY FUND—						
Funding Loan, 2½%, 1956-1961	237	15	8	222	12	11
DEDICATIONS VOLUME FUND (BOTANICAL MAGAZINE)—						
Metropolitan Water Board, 3% B Stock, 1934-2003	29	0	7	27	4	6
Funding Loan, 2½%, 1956-1961	192	12	3	180	3	11
	<u>221 12 10</u>			<u>207 8 5</u>		
THE COLMAN FUND—						
Funding Loan, 2½%, 1956-1961	1,230	11	3	1,153	0	0
P. D. WILLIAMS FUND—						
2½% Consols	439	4	6	372	7	9

NOTICES TO FELLOWS.

SUBSCRIPTIONS.

All Annual Subscriptions are payable in advance on January 1 of each year. Fellows can at any time relieve themselves of any further trouble in the matter, either by compounding by payment of a lump sum for life Fellowship, or by obtaining from the Secretary a banker's order, instructing their bankers to pay their subscription on January 1 each year.

CHANGE OF ADDRESS.

Fellows are reminded that it would be of material assistance to the Secretary in dispatching their tickets, plant distribution lists, JOURNAL, or any other communications that may have to be addressed to them, if any change of address, or change in bankers through whom their subscriptions are paid, were notified to him as soon as possible.

PLANT DISTRIBUTION.

Lists of seeds and plants available for distribution in 1937, together with the form of application for them, were distributed with the January JOURNAL. The application forms must be received on or before March 13, 1937, except from Fellows resident abroad. Should by any chance these lists and forms be mislaid, Fellows should notify the Secretary immediately so that a duplicate set of papers may be sent.

CALENDAR.

February 9, 12 noon to 5 P.M.—Fortnightly Meeting and Show of Flowers in season.

At 3.30 P.M. in the Lecture Room of the New Hall, there will be a lecture by Mr. J. COURTS, V.M.H., on "Plants for the Cool Greenhouse."

February 13.—Closing date for entries for Chelsea Show.

February 23, 12 noon to 7.30 P.M., and February 24, 10 A.M. to 5 P.M.—Fortnightly Meeting and Show of Flowers in season.

At 3.0 P.M. on *February 23*, in the Lecture Room of the New Hall, the ANNUAL GENERAL MEETING will be held.

March 9.—General Examination in Horticulture (Seniors and Juniors).

March 9, 12 noon to 7.30 P.M., and March 10, 10 A.M. to 5 P.M.—Fortnightly Meeting and Show of Flowers in season.

At 3.30 P.M. on *March 9*, in the Lecture Room of the New Hall, the first of the Masters Memorial Lectures will be given by Dr. E. J. SALISBURY, F.R.S., on "The Plant and its Water Supply." A special notice with regard to this will be found on p. xxviii.

March 10 and 11, from 2 to 4 P.M.—Demonstration at Wisley on Seed Sowing, Indoors and Outdoors, particulars of which will be found on p. xxviii.

March 17 and 18, from 2 to 4 P.M.—Demonstration at Wisley on Rose Pruning, particulars of which will be found on p. xxviii.

March 20.—Teachers' Examination in School and Cottage Gardening.

March 23, 12 noon to 7.30 P.M., and March 24, 10 A.M. to 5 P.M.—Fortnightly Meeting and Show of Flowers in season. On this occasion there will be a competition for the Cymbidium Trophy, particulars of which will be found on p. xxviii.

At 3.30 P.M. on *March 23*, in the Lecture Room of the New Hall, the second of the Masters Memorial Lectures will be given by Dr. E. J. SALISBURY, F.R.S., on "The Plant and its Water Supply." A special notice with regard to this will be found on p. xxviii.

HALL LETTINGS.

From *February 16 to 18* the London Baking Trade Exhibition will be held in the Old Hall; should any Fellows be interested and desire further information, application should be made to Mr. A. G. DAVIDSON, Ceres House, 9-13 Pentonville Road, N. 1.

From *March 1 to 6* the annual Badminton Tournaments will be held in the Old Hall. Full particulars may be obtained from Mr. F. W. HICKSON, High Croft, Eversley Park Road, N. 21.

From *March 1 to 5* the Nursing Exhibition will be held in the New Hall; particulars may be obtained from Mr. E. SCHOFIELD, 40 Holland Park, W. 1.

On *March 21*, in the Old Hall, the London Sunday Schools Pageant will be held. Particulars may be obtained from Mrs. GIMSON, 46 Ladbroke Square, W. 11.

xxviii PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

MASTERS MEMORIAL LECTURES, 1937.

The Masters Memorial Lectures for 1937 are to be given by Dr. E. J. SALISBURY, F.R.S., on "The Plant and its Water Supply." The first will take place on *March 9* and the second on *March 23*.

These lectures are the outcome of a fund subscribed to commemorate Dr. MASTERS, who was for a very long period associated with the Society, Chairman of the Scientific Committee, and for long connected with the Lindley Library of which the Society is Trustee.

PRACTICAL DEMONSTRATIONS AT WISLEY.

Two practical demonstrations are to be given at Wisley during March: the first, on *March 10* and *11*, will be on Seed Sowing, Indoors and Outdoors, and the second, on *March 17* and *18*, will be on Rose Pruning. These demonstrations will be given from 2 to 4 P.M., weather permitting, and Fellows who intend to be present are asked to inform the Director, R.H.S. Gardens, Wisley, Ripley, Surrey, beforehand, mentioning on which day they will attend, in order that adequate arrangements may be made.

THE CYMBIDIUM TROPHY.

On *March 23, 1937*, there will be a competition for an exhibit of 12 Cymbidiums (species and/or hybrids) staged by an amateur. This will be the second of the series of competitions for Orchids, the first having been held in *January* for Cypripediums; the third will be held on *April 20* for Odontoglossums, and a further note will appear in the JOURNAL with regard to entries. The Trophies offered for award in these competitions have been presented by the Orchid trade. Entry forms may be had on application to the Secretary, and, for the Cymbidium Competition, should be returned not later than by the first post on Wednesday, *March 17, 1937*.

CORONATION CELEBRATIONS AT CHELSEA SHOW.

In celebration of the Coronation it has been decided to arrange at the Chelsea Flower Show a large exhibit of trees, shrubs and flowers, representing the contribution made by the overseas flora towards the gardens of this country and horticulture in general. This proposal has been met with favourable consideration by His Majesty's Secretary of State for the Colonies and the High Commissioners for the Dominions, and it is gratifying to be able to report that generous support is coming from overseas and a deep interest is being shown in the undertaking.

The organization of the exhibit offers many difficulties, and a delicate task falls upon the overseas authorities, due partly to the climatic conditions of the various countries, and partly to the season at which the show is being held. All these difficulties are disappearing in face of the generous and willing co-operation of the Royal Botanic Gardens, and owners of private gardens and nurseries throughout the country, who have undertaken to fill in the gaps that must necessarily occur in exhibits being received from overseas, many of them supplying flowering plants which otherwise could not be represented.

Plants and bulbs have already arrived from the Falkland Islands and Newfoundland, and advice has been received of consignments coming from the West Indies, and from the West Coast of Africa. Arrangements are being made for these plants to be grown on in this country and prepared for the show.

It is understood that special efforts are being made in the Dominions, Australia, Canada, New Zealand and South Africa, to send representatives of their flora.

PUBLICATIONS.

Daffodil Year Book.

The Daffodil Year Book for 1936 is now available upon application to the Secretary, the price being 5s. in limp cover, 6s. in stiff cover.

Lily Year Book.

The Lily Year Book for 1936 may be obtained upon application to the Secretary, price 5s. in limp cover, 6s. in stiff cover.

Rock Gardens and Rock Plants.

"Rock Gardens and Rock Plants," being the Report of the Conference on Alpine Plants held in 1936, has also been published and is available at 6s. a copy. This report is recommended as giving up-to-date information on rock gardening and the growing of rock plants.

R.H.S. Diary, 1937.

The R.H.S. Diary has now appeared for the twenty-sixth year, and it is pleasing to be able to state that it is the most popular gardeners' diary published.

This year's Diary contains, in addition to many notes on different plants, an article on Ferns. The price is 2s. 2d. post free, in Pluviusin with back loop and pencil; 3s. 8d. post free in Morocco leather (not refillable) with pencil; or 5s. 2d. post free in refillable Crocodile Case with card and stamp pockets.

Fellows are asked particularly to note the slip showing corrections to be made in the Diary which calls attention to the fact that:

(1) The date of the Fruit and Vegetable Show has been changed from October 7 and 8 to October 12 and 13, 1937.

(2) The R.H.S. Fortnightly Shows will open at 12 o'clock instead of 1 o'clock as printed.

They are asked also to note that the National Auricula and Primula Society's Show will be held on April 20 and 21 as given in the Calendar in the January JOURNAL, and not on May 4 and 5 as given in the Diary.

The attention of Fellows is called to two recent books published by the Society containing the latest information regarding the cultivation of their respective subjects and on the newest varieties, which should be especially useful for the planting season.

They are:

Apples and Pears: Varieties and Cultivation in 1934. Price 7s. 6d. post free.

Cherries and Soft Fruits: Varieties and Cultivation in 1935. Price 6s. post free.

SMALL EXHIBITS FROM FELLOWS.

Fellows are invited to exhibit interesting or well-grown plants, flowers, fruits or vegetables on the special small exhibits table. Any Fellow who desires to stage an exhibit consisting of not more than three pots, vases, or dishes, may do so at any Fortnightly Meeting, although he has not applied for space beforehand. Such exhibits must be entered with the clerk at the small exhibits table by noon on the morning of the Meeting, and he will provide exhibitors' cards and stage the exhibits. Exhibitors are not permitted to place on this special table any notice or leaflets, nor may any orders be booked there. Exhibits staged under this regulation may be considered for Certificates of Cultural Commendation.

Descriptions of interesting exhibits appear from time to time in these notes.

WISLEY IN FEBRUARY.

Apart from a few early-flowering shrubs and other plants the chief items of interest this month are to be found in the various glass-houses at Wisley, and dealing with these in order we come first to the Half-hardy House nearest the Laboratory.

Here is the bright yellow shrubby *Cassia stipulacea* climbing on one of the supports of the house, and at the farther end two species of *Canarina* with orange-red, bell-shaped flowers like a Campanula. The prostrate form of *Acacia diffusa*, from Tasmania, grows immediately below these and is a most attractive sight when in full flower. Passing to the second glass-house we find a number of different strains of the popular *Primula malacoides*, some on trial, others grown for comparison with them. A vigorous white form is included.

In the large Temperate House are several shrubs of great beauty in bloom at this dull season; Acacias in variety, the almost ever-flowering *Abutilon insigne*, Camellias, *Epacris* species, the semi-double *Jasminum primulinum* of soft yellow hue, creamy-coloured *Loropetalum chinense* and buff *Pomaderris elliptica*. Some of the more tender *Rhododendron* species or hybrids also flower now, such as *R. ciliicalyx* and *R. 'Countess of Haddington'*.

The other glass-house worthy of a visit is the Alpine House at the top of the rock garden. Here will be the earliest encrusted Saxifrages—pink, white or yellow—small species of Daffodil, *Primula Winteri* and perhaps others; some of the dwarf Irises are also likely to be in flower by this time, at least towards the end of the month.

In the Wild Garden the visitor may see those attractive tall shrubs, the *Hamamelis*, decked with starry yellow blossoms, and in the case of *H. mollis* will also probably notice the strong scent. *Mahonia japonica*, *Daphne Mezereum*, and *Rhododendron mucronulatum* are other shrubs which bloom here this month.

The Heath Garden in Seven Acres is at this time of the year particularly gay, for the many varieties of *Erica carnea* are now at their best and continue to make a bright splash of colour for several weeks. On the rock wall facing the glass-house there is also an extensive planting of the white form found in Italy, 'Springwood White.'

As visitors enter or leave the Gardens they may see on the south face of the Laboratory the evergreen *Garrya elliptica*, with its long pale catkins, and the vivid purple of *Iris unguicularis (stylosa)*.

XXX PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

GENERAL MEETINGS.

NOVEMBER 10, 1936.

Gold Grenfell Medal.

To Mrs. M. M. V. Pycroft, 61 The Avenue, Kew, for an exhibit of Watercolour Paintings of New Zealand Flora.

Silver-gilt Grenfell Medal.

To Lady Beatrix Stanley, C.B.E., C.I., Sibbertoft Manor, Market Harborough, for an exhibit of Watercolour Paintings of Lilies and Fritillaries.

Silver Grenfell Medal.

To Lieut.-Commander J. P. W. Furse, R.N., 10 Bramley Flats, Alverstoke, for an exhibit of Watercolour Paintings of *Nomocharis*.

Grenfell Medal.

To Miss Winifred Walker, 25 Tanza Road, Hampstead, for an exhibit of Watercolour Paintings of Flowers.

The Second Masters Memorial Lecture was given by Dr. R. N. SALAMAN on "The Potato in its Early Home and its Introduction into Europe."

Chairman, Sir WILLIAM LOBJOIT, O.B.E., J.P., V.M.H.

SCIENTIFIC COMMITTEE.—Mr. E. A. BOWLES, M.A., F.L.S., V.M.H., in the Chair, and seven other members present.

Scented Pelargoniums.—Mr. Langley Smith submitted photographs and notes on the influence of cross-breeding on scent and leaf form in scented-leaved *Pelargoniums*. Parts of the plants had been shown at a previous meeting (see JOURNAL R.H.S. 61, p. cxcviii).

Apple Pollination.—Mr. C. H. Hooper discussed the pollination and fruit setting of late varieties of Apples including 'Crawley Beauty,' 'Court Pendu Plat,' 'King Edward VII' and 'Royal Jubilee.' Fruits did not set on these varieties when they were hand pollinated with their own pollen, neither did flowers left untouched bear fruit, but on a tree in the open of 'Crawley Beauty' which flowered after all the other Apples, a good crop with well-developed fruits was obtained. Cross-pollination made between these varieties set a few fruits.

Various plants.—Mr. Streeter submitted a branch of an oak growing to 12 feet, rather lax in habit. It was identified as *Quercus Cerris* var. *laciniata*.

A plant sent by Mrs. Torkington of Maidenhead was identified as *Forsythia clypeata*.

A *Bromeliad* referred to this Committee from Floral Committee B and shown by Messrs. Russell of Windlesham, who considered it might be an intergeneric hybrid between *Billbergia* and *Nidularium*, was examined. Messrs. Russell were asked to send flowers when more fully developed.

FRUIT AND VEGETABLE COMMITTEE.—Mr. E. A. BUNYARD, F.L.S., in the Chair, and seven other members present.

Award Recommended:—

Hogg Medal.

To Messrs. Daniels Bros., Norwich, for collection of Apples.

Other Exhibits.

Waterperry Horticultural School Ltd., near Oxford: collection of Apples.

R.H.S. Commercial Fruit Trials, Wisley: Apples 'Bowden's Seedling' and 'Laxton's Pearmain.'

Mr. W. B. Bashyr-Pickard, Darullah, Bengoe, Hertford: seedling Apple.

Mr. H. Brown, The Gardens, Silverlands, Chertsey: seedling Apple.

Mr. H. H. Crane, "Highmead," Chiney Lane, Eastcote, Pinner: Apple 'Highgate Pippin.'

Mr. G. Thompson, 3 Farm Road, Lillington, Leamington Spa: Apple 'Arnold's Seedling.'

FLORAL COMMITTEE A.—Mr. J. M. BRIDGEFORD in the Chair, and eighteen other members present.

Awards Recommended :—

Gold Medal.

To J. Pierpont Morgan, Esq. (gr. Mr. F. A. Steward), Watford, for Begonias, Gesnerias and foliage plants.

Silver-gilt Banksian Medal.

To Messrs. Sutton, Reading, for Cascade Chrysanthemums.

Silver Flora Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.

Silver Banksian Medal.

To Messrs. Vinten, Balcombe, for Chrysanthemums.

Flora Medal.

To Messrs. Engelmann, Saffron Walden, for Carnations.

To Messrs. Low, Enfield, for Carnations and other greenhouse plants.

To Messrs. Luxford, Sawbridgeworth, for Chrysanthemums.

Banksian Medal.

To Mr. S. Ogg, Swanley, for Dahlias.

To Messrs. Spencer, Hockley, for Dahlias.

Award of Merit.

To Chrysanthemum 'Jean Brydie' for market (votes unanimous), from Mr. T. Stevenson, Hillingdon.

To Chrysanthemum 'Red Dome' for market (votes unanimous), from Mr. T. Stevenson, Hillingdon.

Other Exhibits.

Lt.-Col. R. W. Barclay, Dorking : Chrysanthemum 'Priscilla.'

Messrs. Clark, Dover : Scabious.

Messrs. Greenyer, Worthing : Chrysanthemums.

Mr. C. H. Kettle, Corfe Mullen : Violets.

A. J. Tanner, Esq., Brentwood : Chrysanthemum 'Mary Chamen.'

FLORAL COMMITTEE B.—Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and fifteen other members present.

Awards Recommended :—

Silver Flora Medal.

To Messrs. Cheal, Crawley, for Hollies and other berried shrubs.

Flora Medal.

To Messrs. Hemsley, Crawley, for berried and foliage shrubs.

Banksian Medal.

To Mr. J. Klinkert, Richmond, for clipped Box trees.

To Messrs. Russell, Windlesham, for berried and foliage shrubs.

Award of Merit.

To *Pyracantha atalantioides forma aurea* as a hardy ornamental fruiting shrub (votes 13 for), from the Director, R.H.S. Gardens, Wisley. See p. 88.

Other Exhibits.

W. Bentley, Esq., Newbury : *Saxifraga cortusaefolia rosea*.

Messrs. Elliott, Stevenage : *Gentiana sino-ornata*.

G. F. M. Grigg, Esq., Plymouth : *Pittosporum chinense*.

Miss Hopkins, Coulsdon : rock garden plants.

Edward Howarth, Esq., Kirdford : *Viburnum venosum* var. *Canbyi*, *Liquidambar laevis*.

Lady Leconfield, Petworth : *Photinia villosa*, *Clerodendron trichotomum*.

Messrs. Russell, Windlesham : *Billbergia Saundersii*.

Mrs. Alec Waugh, Reading : *Nerine filifolia*, *Eucalyptus radiata*.

Mr. R. Colpoys Wood, West Drayton : evergreen shrubs.

ORCHID COMMITTEE.—LIONEL DE ROTHSCHILD, Esq., in the Chair, and thirteen other members present.

Awards Recommended :—

Award of Merit.

To *Cattleya* × 'Porcea' (*Bowringiana* × *Armstrongiae*) (votes 10 for, 2 against), from E. Kenneth Wilson, Esq., "Cannizaro," Wimbledon. See p. 87.

To *Oncidium Forbesii* var. *Measuresianum* (votes 11 for, 1 against), from Messrs. Sanders, St. Albans. See p. 88.

xxxii PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

To *Odontoglossum* × 'Petulium' var. *magnum* ('Toreador' × *crispum*) (votes 8 for, 1 against), from Messrs. Charlesworth, Haywards Heath. See p. 87.

Cultural Commendation.

To Mr. W. Allison, gr. to E. Kenneth Wilson, Esq., Wimbledon, for *Cattleya* × 'Porcea' (*Bowringiana* × *Armstrongiae*), a robust plant with three many-flowered spikes.

Other Exhibits.

Messrs. Charlesworth, Haywards Heath: a group of Orchids.

Messrs. Armstrong & Brown, Tunbridge Wells: a group of Orchids.

Messrs. Stuart Low, Jarvis Brook: a group of Orchids.

Messrs. H. G. Alexander, Tetbury: a group of Orchids.

Capt. Geoffrey Brocklebank, Hawkhurst: *Odontonia* × 'Amphaea.'

JOINT PERPETUAL FLOWERING CARNATION COMMITTEE.—Mr. J. M. BRIDGEFORD in the Chair, and nine other members present.

Exhibits.

Carnations 'Virginia' (to be seen again) and 'Greatheart,' shown by Messrs. C. Engelmann, Saffron Walden.

Carnations 'Aida' (to be seen again), 'Peter Fisher' (to be seen again), 'Lindy Lou' and 'Marchioness of Headfort,' from Messrs. Allwood, Wivelsfield, Haywards Heath.

EXTRACTS FROM THE PROCEEDINGS

OF THE

ROYAL HORTICULTURAL SOCIETY.

NOTICES TO FELLOWS.

SUBSCRIPTIONS.

Subscriptions became due on January 1. Fellows who have not yet paid their subscriptions are reminded that on March 15, 1937, the last day on which applications for surplus plants and seeds can be received, one of the privileges of Fellowship ceases.

If Fellows wish to relieve themselves of any further trouble in the payment of their subscriptions, they may either compound by payment of a lump sum for life Fellowship, or obtain from the Secretary a banker's order, instructing their bankers to pay their subscription on January 1 each year.

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PLANT DISTRIBUTION.

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THE SOCIETY'S ACTIVITIES DURING MARCH AND APRIL.

March 1.—All applications for space at Chelsea Show should reach the Secretary by this date.

March 9, 12 noon to 7.30 P.M.—Fortnightly Meeting and Show of Flowers in season.

At 3.30 P.M., on March 9, in the Lecture Room of the New Hall, the first of the year's Masters Memorial Lectures will be given by Dr. E. J. SALISBURY, F.R.S., on "The Plant and its Water Supply." A note on the Masters Memorial Lectures will be found on p. xxxiv.

On *March 9* the Society's General Examinations in Horticulture, for both Seniors and Juniors, will be held throughout the country.

March 10, 10 A.M. to 5 P.M.—Fortnightly Meeting and Show of Flowers in season, continued.

On *March 10*, from 2 to 4 P.M., there will be a Demonstration at Wisley on Seed Sowing, Indoors and Outdoors.—See p. xxxv.

March 11, 2 to 4 P.M.—Demonstration at Wisley on Seed Sowing.

March 17, 2 to 4 P.M.—Demonstration at Wisley on Rose Pruning.—See p. xxxv.

March 18, 2 to 4 P.M.—Demonstration at Wisley on Rose Pruning.—See p. xxxv.

March 20.—The Society's Examination in School and Cottage Gardening for Teachers will be held throughout the country.

xxxiv PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

March 23, 12 noon to 7.30 P.M.—Fortnightly Meeting and Show of Flowers in season. On this occasion there will be a competition for the Cymbidium Trophy.—See p. xxxv.

At 3.30 P.M., on *March 23*, in the Lecture Room of the New Hall, the second of the year's Masters Memorial Lectures will be given by Dr. E. J. SALISBURY, F.R.S., on "The Plant and its Water Supply."—See below.

March 24, 10 A.M. to 5 P.M.—Fortnightly Meeting and Show of Flowers in season, continued.

April 3, 1 P.M. to 7 P.M.—London Gardens Society's Spring Flower Show in the Old Hall.

April 6, 12 noon to 7.30 P.M.—Fortnightly Meeting and Show of Flowers in season.

At 3.30 P.M., on *April 6*, in the Lecture Room of the New Hall, Dr. W. B. TURRILL will give a lecture on "Fritillaries."

April 7, 10 A.M. to 5 P.M.—Fortnightly Meeting and Show of Flowers in season, continued.

At 3.30 P.M., on *April 7*, in the Lecture Room of the New Hall, Mr. J. E. GRANT WHITE will give a lecture, under the auspices of the Institute of Landscape Architects, on "The Planning of a Small Garden."

Entries for the Early Market Produce Show should reach the Secretary not later than *April 7*.

From 2 to 4 P.M., on *April 7*.—Demonstrations at Wisley on the Spraying of Fruit Trees and the Pruning of Shrubs.—See p. xxxv.

April 8, 2 to 4 P.M.—Demonstrations at Wisley on the Spraying of Fruit Trees and the Pruning of Shrubs.—See p. xxxv.

April 10.—Entries for the Daffodil Show should reach the Secretary not later than this date.

April 15, 1 P.M. to 7.30 P.M.—Daffodil Show in the New Hall, and Early Market Produce Show in the Old Hall.

At 3.30 P.M., on *April 15*, in the Lecture Room of the New Hall, Dr. G. E. FRIEND will give a lecture on "Vegetables as an Article of Diet."

April 16, 10 A.M. to 5 P.M.—Daffodil Show and Early Market Produce Show, continued.

April 20, 12 noon to 7.30 P.M.—Fortnightly Meeting and Show of Flowers in season. On this occasion there will be a competition for the Odontoglossum Trophy.—See p. xxxv. The Alpine Garden Society's Spring Show and the National Primula and Auricula Society's Annual Show will be held in conjunction with the Society's Show. Both Halls will be used.

At 3.30 P.M., on *April 20* in the Lecture Room of the New Hall, Mr. H. F. R. MILLER will give a lecture on "Sempervivums," and at 4.30 P.M., in the Restaurant of the Old Hall, there will be a Meeting of the Iris Group, at which Mr. G. P. BAKER will give a lecture on "The Cultivation of Iris Species."—See p. 14.

April 21, 10 A.M. to 5 P.M.—Fortnightly Meeting and Show of Flowers in season, and also the Alpine Garden Society's and the National Primula and Auricula Society's Shows, continued.

April 24.—The written part of the Examination for the National Diploma in Horticulture will be held throughout the country.

April 27, 1 P.M. to 7.30 P.M.—British Carnation Society's Spring Show in the Old Hall. Joint Perpetual-Flowering Carnation Committee will meet at 12 noon.

April 28, 10 A.M. to 5 P.M.—British Carnation Society's Spring Show, continued.

HALL LETTINGS.

From *March 1* to 6 the annual Badminton Tournaments will be held in the Old Hall. Full particulars may be obtained from Mr. F. W. HICKSON, High Croft, Eversley Park Road, N. 21.

From *March 1* to 5 the Nursing Exhibition will be held in the New Hall; particulars may be obtained from Mr. E. SCHOFIELD, 40 Holland Park, W. 1.

On *March 21*, in the Old Hall, the London Sunday Schools Pageant will be held. Particulars may be obtained from Mrs. GIMSON, 46 Ladbroke Square, W. 11.

MASTERS MEMORIAL LECTURES, 1937.

The Masters Memorial Lectures for 1937 are to be given by Dr. E. J. SALISBURY, F.R.S., on "The Plant and its Water Supply." The first will take place on *March 9* and the second on *March 23*.

These lectures are the outcome of a fund subscribed to commemorate Dr. MASTERS, who was for a very long period associated with the Society, Chairman of the Scientific Committee, and for long connected with the Lindley Library of which the Society is Trustee.

DEMONSTRATIONS AT WISLEY.

Weather permitting, demonstrations of horticultural operations will be given at Wisley during March and April as follows :

Seed Sowing, Indoors and Outdoors, on March 10 and 11.

Rose Pruning, on March 17 and 18.

Spraying Fruit Trees, on April 7 and 8.

Shrub Pruning, on April 7 and 8.

All these demonstrations will take place between 2 and 4 P.M. Fellows who intend to be present at a demonstration should notify the Director, R.H.S. Gardens, Wisley, Ripley, Surrey, beforehand, so that adequate arrangements may be made.

CYMBIDIUM AND ODONTOGLOSSUM TROPHIES.

Two silver trophies, presented by the Orchid Trade, are offered for award, one in March and the other in April.

At the Fortnightly Show on *March* 23 and 24, a trophy is offered for an exhibit of 12 Cymbidium plants, species and/or hybrids, shown by an amateur.

At the Fortnightly Show on *April* 20 and 21, a trophy is offered for an exhibit of 25 plants of Odontoglossum, species and/or hybrids, shown by an amateur. Hybrids with other genera will be admissible, *e.g.* Odontioda, Odontonia, etc.

Entries must be made on special forms obtainable from the Secretary, by whom the completed forms must be received not later than by the first post on the Wednesday preceding the Show.

EMPIRE EXHIBIT AT CHELSEA SHOW.

To celebrate the Coronation, there will be at Chelsea Show an exhibit representing the contributions made to horticulture by the floras of the various parts of His Majesty's Empire overseas. The project has the approval of the Secretary of State for the Colonies and the High Commissioners for the Dominions, all of whom have very kindly nominated representatives to act on the organizing committee. The authorities overseas have willingly promised their active support, and already plants or seeds have arrived from Canada, South Africa, Bahamas, Bermuda, British Guiana, Cyprus, Falkland Islands, Gambia, Malta, Mauritius, Newfoundland, St. Helena, Windward Isles, Nyasaland, and Palestine.

The organization of an exhibit of this sort is naturally attended by considerable difficulties, owing largely to the great distances which the plants have to travel and the short time available for their preparation after arrival. The greatest possible assistance is being received from the Director and Curator of the Royal Botanic Gardens at Kew, where most of the imported plants are being cared for. The Society is also greatly indebted to a number of amateurs and horticultural traders who, upon being approached, have willingly undertaken to augment the plants received from overseas. It is believed that the resulting Empire Exhibit will be an outstanding feature of the Show, and a special attraction to the visitors from the Dominions and Colonies who will be in London for the Coronation.

SPECIAL AWARDS AT CHELSEA SHOW.

In order to encourage exhibitors to provide especially fine displays at the Chelsea Show in this Coronation year, the Council has decided that every exhibitor who is awarded the Society's Gold Medal shall also receive a Silver-gilt Cup.

SMALL EXHIBITS FROM FELLOWS.

Most Fellows have from time to time some plant, flower, fruit or vegetable which, because it is uncommon or especially well grown, would be of interest to other Fellows if it were exhibited at one of the Fortnightly Meetings. The Council hopes that Fellows will keep this in mind and make use of the Small Exhibits Table on the dais. It is not necessary to apply beforehand for space on this special table, but Fellows are asked to bring their exhibits by 12 noon on the first day of a Meeting, and to hand them to the clerk who is in attendance on the dais up to that hour, and who will provide cards to go with the exhibits. No exhibit staged under this arrangement should consist of more than three pots, vases or dishes.

THE HORTICULTURAL COLOUR CHART.

With this JOURNAL is circulated a leaflet describing the Horticultural Colour Chart which is being published by the British Colour Council in collaboration

XXXVI PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

with the Society. It is important that Fellows who wish to obtain this unusual and extremely valuable publication should order it immediately, because in a few weeks it will be impossible for the Society to obtain further copies at the advantageous pre-publication price. Fellows who have already ordered their copies are particularly requested to pass the leaflet on to someone else who is interested in the naming of colours.

PUBLICATIONS.

A list of the Year-books, Reports on Conferences and other publications of the Society may be had on application to the Secretary.

CONFERENCE ON FLOWERING TREES AND SHRUBS.

Arrangements are being made for a Conference on Flowering Trees and Shrubs to be held next year from April 26-28, and at the present moment subjects for debate at the Conference are under consideration. In conjunction with the Conference an exhibition of flowering trees and shrubs will be staged.

Any Fellows particularly interested in the subject of this Conference are asked to notify the Secretary, and when further particulars become available they shall be sent.

WISLEY IN MARCH.

The first month of spring brings into flower many bright and attractive plants in all parts of the Gardens, but especially in the rock and wild gardens and among the shrubs and heathers in Seven Acres. There the earlier varieties of the large collection of Daffodils will be of interest, while the Alpine House should be almost at its floral peak, having Saxifrages, Irises, Narcissi, Cyclamens, Primulas, and a variety of other plants to show. In the adjoining beds the Crocuses, and towards the end of the month the earliest species of Tulips, will form a gay multi-coloured patch on a sunny day.

On the rock garden the spring bulbs push up their heads into bloom, of which Scilla, Chionodoxa, Galanthus and Leucojum may be mentioned, whilst this is also the time to see the wonderful effect made by the quantities of *Narcissus Bulbocodium* naturalized in the grass of the Alpine Meadow. A group of *Rhododendron moupinense* will be evident in the upper corner of the Meadow.

Along the paths of the Wild Garden *N. cyclamineus* is perfectly at home, and here also is the rich purple *Primula denticulata*, pale pink *Shortia galacifolia*, several species of *Pieris*, varieties of *Camellia japonica*, and the first of the *Rhododendrons lutescens*, which is particularly suitable for woodland planting, and the hybrid *R. × praecox*.

Except for the late summer this is the chief period of bloom among the heathers in Seven Acres; varieties of *Erica carnea*, such as the crimson *Vivellii*, have not ceased flowering; the valuable hybrid *E. × darleyensis* is at its best, the tall fragrant *E. lusitanica* will probably be still producing long spikes of white flowers, whilst several varieties of the Mediterranean Heath now form large clumps of rosy or pale pink, from 9 inches to 4 feet in height. Of the shrubs in the same area the Forsythias are most prominent in the abundance of their yellow blossoms, but the Willows round the pond as well as the first flowers of Berberis and Spiraeas have their beauty too; the various forms of Almond, *Prunus cerasifera* and its varieties, *P. Conradinae*, and the bushy *P. tomentosa* add conspicuous masses of colour. It is worth a walk through the Pinetum now to see the trees of that fine form of Almond named *Pollardii* in Howard's Field covered with their wonderful rich pink blossoms.

Returning, the visitor will find below the old Apple trees on the way to the glasshouses the comprehensive collection of Dutch Crocuses in full bloom. In the houses themselves are many interesting tender or half-hardy shrubs and plants, of which we may particularly mention *Loropetalum*, *Pomaderris*, and the scarlet Bottle-Brush, *Callistemon*; in another adjoining greenhouse *Cinerarias*, *Primulas*, and *Freesias* are likely to be the principal features, and in the half-hardy house nearest to the Laboratory is the lovely prostrate form of *Acacia diffusa*, *Paeonia Cambessedesii*, *Primula Palinuri* and other plants. On the wall of the Laboratory a tall specimen of *Acacia dealbata* is particularly noticeable at this season, whilst *Garrya elliptica* and the Algerian *Iris unguicularis* should also be decorative.

GENERAL MEETINGS.

NOVEMBER 24, 1936.

Silver Grenfell Medal.

To Lieut.-Commander J. P. W. Furse, R.N., 10 Bramley Flats, Alverstoke, for an exhibit of Water-colour Paintings of Narcissi.

To Mr. A. G. Stubbs, 71 Berriedale Avenue, Hove, for an exhibit of Paintings of Plants, Flowers, Foliage and Berries.

To Miss B. G. Watts, 100 Netherby Road, Edinburgh, 5, for an exhibit of Paintings and Drawings of Flowers and Plants.

Grenfell Medal.

To Mrs. Norman Stone, Eeyores, Horsham Road, Cranleigh, for an exhibit of Oil and Water-colour Paintings of Flowers.

To Miss C. E. Peters, Arlington Court, Barnstaple, for an exhibit of Water-colour Paintings of Flowers.

To Miss E. M. Burgess, 1408 Kensington Park Road, W. 11, for an exhibit of Water-colour Paintings of Flowers.

To Miss G. Thomasett, 11 St. Mildreds Road, Lee, S.E., for an exhibit of Water-colour Paintings of Flowers and Berries.

A lecture was given by Mr. J. Woolman on "New Chrysanthemums." Chairman, Lady Wightman. See p. 128.

SCIENTIFIC COMMITTEE.—Mr. E. A. BOWLES, M.A., F.L.S., V.M.H., in the Chair, and ten other members present.

Moth caught in flower.—Mr. F. G. Preston showed a flower of *Arauja sericofera* which had captured a moth (*Plusia gamma*), as these flowers frequently do.

Manganese in soil.—Dr. Voelcker reported that a soil recently sent to him for analysis from a garden in the Isle of Wight proved to contain a high percentage of manganese. He was inquiring further into it.

Fruit of Juniperus Coxii.—Mr. A. B. Jackson showed a fruiting shoot of *Juniperus Coxii* from Mr. Rothschild's garden at Exbury. He drew attention to the two stomatic lines on its leaves, a distinction from *J. formosana*.

Fatsiedera × Lizei.—A flowering branch of this hybrid between *Fatsia japonica* and an Ivy from Mr. F. C. Stern's garden at Goring-by-Sea was referred to the Committee from Floral Committee B, and a Botanical Certificate was recommended to it.

FRUIT AND VEGETABLE COMMITTEE.—Mr. E. A. BUNYARD, F.L.S., in the Chair, and eleven other members present.

Awards Recommended:—*Silver-gilt Hogg Medal.*

To Mr. Howard H. Crane, Highmead, Cheney Lane, Eastcote, Pinner, for collection of Apples.

Silver Hogg Medal.

To Messrs. Laxton Bros., Bedford, for collection of Apples.

Hogg Medal.

To Messrs. Cheal and Sons, Crawley, Sussex, for collection of Apples.

Other Exhibits.

Messrs. Engelmann, Saffron Walden, Essex, on behalf of Messrs. J. J. La Montagne, 340 Washington Street, Woburn, Massachusetts, U.S.A.: collection of Maize with vari-coloured grains.

R.H.S. Commercial Fruit Trials, Wisley: Apple 'Lawfam.'

Mr. W. H. Divers, Westdean, Hook, nr. Surbiton: Apples 'John Divers' and 'Colonel Yate.'

Miss M. W. Richmond, Bescas Brow Lane, Scarisbrick, nr. Ormskirk: Apple 'Richmond's Seedling.'

Mr. A. E. Green, 1 Station Road, Ropley, Hants: seedling Apples.

Mr. G. C. Addy, Appledene, Eastwood, Southend-on-Sea: Apple 'Sunset,' from trees on four different root-stocks.

Mr. M. B. Crane, John Innes Horticultural Institute, Mostyn Road, Merton Park, S.W. 19: seedling Apples Nos. 180, 856, 911, 920.

Mr. E. A. Bunyard, Allington, Maidstone: 'Palm' Kale.

FLORAL COMMITTEE A.—Mr. G. W. LEAK, V.M.H., in the Chair, and eleven other members present.

Awards Recommended :—

Silver Floral Medal.

To Messrs. Luxford, Sawbridgeworth, for Chrysanthemums.

To Napsbury Mental Hospital, St. Albans (gr. Mr. W. J. Jennings), for Chrysanthemums.

Silver Banksian Medal.

To Ashington Nurseries, Ashington, for Chrysanthemums.

To Messrs. Greenyer, Worthing, for Chrysanthemums.

To Messrs. Vinten, Balcombe, for Chrysanthemums.

Banksian Medal.

To Messrs. Toogood, Southampton, for Primulas.

Award of Merit.

To Chrysanthemum 'Crofton Gold' for show, cutting and market (votes unanimous), from F. L. Dight, Esq., Orpington. See p. 87.

Other Exhibits.

Messrs. Clark, Dover : Scabious.

Misses Hopkins, Coulsdon : hardy plants.

A. E. Smith, Esq., Wenvoe : Chrysanthemum 'Gertrude Smith.'

R. W. Stockill, Esq., Knaresborough : Chrysanthemum 'Aresco Single' (to be seen again).

J. Walker, Esq., Cannock : Chrysanthemum 'Mrs. Nellie Walker' (to be seen again).

FLORAL COMMITTEE B.—Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and sixteen other members present.

Awards Recommended :—

Flora Medal.

To Messrs. Russell, Windlesham, for evergreen and berried shrubs.

Banksian Medal.

To Mr. J. J. Klinkert, Richmond, for clipped Box trees.

Other Exhibits.

Messrs. Garways, London, W.C. 1 : succulents.

Messrs. Neale, Worthing : succulents.

L. de Rothschild, Esq., Exbury : *Viburnum theiferum*.

F. C. Stern, Esq., Goring-by-Sea : *Fatsydera* × *Lizei*.

The Director, R.H.S. Gardens, Wisley : *Coprosma rugosa*.

Mr. R. Colpoys Wood, West Drayton : shrubs.

ORCHID COMMITTEE.—Sir JEREMIAH COLMAN, Bt., in the Chair, and thirteen other members present.

Awards Recommended :—

Award of Merit.

To *Cypripedium* × 'Balaclava' var. 'Brigadier' ('Gwen Hannen' × 'Warrior') (votes 9 for, 4 against), from Lionel de Rothschild, Esq., Exbury, Southampton. See p. 87.

To *Cypripedium* × 'Kay-Kay' var. 'Sunny' ('Atlantis' × 'Mrs. William Pickup') (votes 12 for), from M. L. Wells, Esq., Chiddingfold, Surrey. See p. 87.

To *Dendrobium phalaenopsis Schroederianum* var. 'Laure Sladden' (votes unanimous), from Messrs. Sanders, St. Albans. See p. 87.

Other Exhibits.

Messrs. Charlesworth, Haywards Heath : a group of Orchids.

Messrs. Armstrong & Brown, Tunbridge Wells : a group of Orchids.

Messrs. Sanders, St. Albans : a group of Orchids.

Messrs. Stuart Low, Jarvis Brook : a group of Orchids.

Messrs. H. G. Alexander, Tetbury : a group of Orchids.

Messrs. J. & A. McBean, Cooksbridge : a group of Orchids.

F. J. Hanbury, Esq., East Grinstead : *Odontioda* × 'Ethel L. Hanbury' (*Odontioda* 'Radiant' × *Odontoglossum* 'Treador').

JOINT PERPETUAL-FLOWERING CARNATION COMMITTEE : British Carnation Society's Show.—Mr. J. M. BRIDGEFORD in the Chair, and nine other members present.

Exhibits.

Carnations 'Flesh Pink Betty Lou' (to be seen again), 'Royal Apricot' (to be seen again), 'Chocolate Pelargonium', 'Allwood's Primrose' and 'Lady Hudson,' shown by Messrs. Allwood Bros., Haywards Heath, Sussex.

Carnation 'Margaret of Stokesay,' shown by Miss Jewell Allcroft, Onibury, Salop.

Carnation 'Celia' (to be seen again), shown by Messrs. C. Engelmann, Saffron Walden, Essex.

Carnation 'Jasper Clutterbuck,' shown by W. Cooper, Esq., Lydney, Glos.

Carnation 'Audrey Wills,' shown by Mr. Noel Wills, Misenden Park, Stroud, Glos.

Carnation 'Bonanza' (to be seen again), shown by Messrs. Stuart Low, Enfield, Middlesex.

Carnation 'Magellii' and 'Sport from Dairy Maid,' shown by Sir Walter Lawrence, Hyde Hall, Sawbridgeworth.

DECEMBER 8, 1936.

Silver-gilt Grenfell Medal.

To Mrs. Vera Higgins, 28, Northampton Road, Croydon, for an exhibit of Water-colour Drawings of Ceropegias and Stapelias.

To Mrs. M. E. Robinson, Berigem, Maresfield Park, Sussex, for an exhibit of Water-colour Drawings of Flowers of South India.

Silver Grenfell Medal.

To Miss Lucy Burton, Stott Park, Lakeside, Ulverston, Lancs., for an exhibit of Water-colour Paintings of Flowers and Gardens.

To Miss Winifred Walker, 25, Tanza Road, Hampstead, N.W., for an exhibit of Water-colour Paintings of Daffodils and Paeonies.

Grenfell Medal.

To Miss Dora Ratman, 186, Bedford Hill, Balham, S.W., for an exhibit of Flower Paintings.

SCIENTIFIC COMMITTEE.—Mr. E. A. BOWLES, M.A., F.L.S., F.R.E.S., V.M.H. in the Chair, and five other members present.

Holly foliage variants.—Mr. Hales showed a shoot of Holly from Essex in which the lower part had entire leaves, the upper spiny. A question as to whether the shoot had been injured arose, into which Mr. Hales undertook to enquire.

FRUIT AND VEGETABLE COMMITTEE.—Mr. E. A. BUNYARD, F.L.S., in the Chair, and eleven other members present.

Exhibits.

Waterperry Horticultural School, near Oxford: collection of Apples.

Mr. E. A. Bunyard, Allington, Maidstone: Apple 'Orleans Reinette.'

Mr. W. H. Divers, Westdean, Hook, near Surbiton: Apple 'Barnack Orange.'

Mrs. E. L. Young, Pine Tree Lodge, 200 Icknield Way, Letchworth, Herts.: Apple 'Young's Pinello.'

Mr. H. Barnett, Westwood House, Tilehurst, Berks.: Pear 'Josephine de Malines'; Quince 'Smyrna.'

FLORAL COMMITTEE A.—Mr. J. M. BRIDGEFORD in the Chair, and sixteen other members present.

Awards Recommended:—

Silver-gilt Banksian Medal.

To Baron Bruno Schröder (gr. Mr. F. A. Bush, N.D.H.), Englefield Green, for Begonias (Gloire de Lorraine types).

Silver Flora Medal.

To Margate Corporation Parks Department (Supt. Mr. S. Legg), for Cyclamens.

Silver Banksian Medal.

To Messrs. Vinten, Balcombe, for Chrysanthemums.

Flora Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.

To Ashington Nurseries, Ashington, for Carnations and Chrysanthemums.

To Messrs. Low, Enfield, for Carnations.

To Messrs. Vinten, Balcombe, for Chrysanthemum 'Yellow American Beauty.'

Banksian Medal.

To Messrs. Chaplin, Waltham Cross, for Chrysanthemum 'George Prickett.'

To Messrs. Engelmann, Saffron Walden, for Carnations and Antirrhinums.

To Messrs. Greenyer, Worthing, for Chrysanthemums.

To Messrs. Luxford, Sawbridgeworth, for Chrysanthemums.

First-class Certificate.

To Chrysanthemum 'Yellow American Beauty' for market (votes 12 for, 3 against), from Mr. T. Stevenson, Hillingdon. See p. 87.

XI PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

Messrs. Greenyer, Worthing : Chrysanthemum ' Winter Glory ' (to be seen again).

Other Exhibits.

The Lord Wandsworth Agricultural College, Long Sutton : Chrysanthemum ' Ida Scott ' (to be seen again).

Mr. J. A. Macleay, Ayr : Chrysanthemums ' Bronze Favourite ' and ' Old Rose Favourite ' (to be seen again).

Mr. W. F. Rowles, Bury St. Edmunds : Chrysanthemum ' Hardwick Pink.'

Messrs. Toogood, Southampton : Cyclamen.

FLORAL COMMITTEE B.—Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and seventeen other members present.

Awards Recommended :—

Flora Medal.

To Messrs. L. R. Russell, Windlesham, for foliage and berried shrubs.

To W. G. Theobald, Esq., Steyning, for Echeverias.

Banksian Medal.

To Mr. J. Klinkert, Richmond, for clipped Box trees.

Other Exhibits.

Messrs. Clark, Dover : shrubs and hardy plants.

Miss Hopkins, Coulsdon : rock garden plants.

Mr. R. Colpoys Wood, West Drayton : evergreen shrubs.

ORCHID COMMITTEE.—Sir JEREMIAH COLMAN, Bt., in the Chair, and thirteen other members present.

Award Recommended :—

Award of Merit.

To *Cypripedium* × ' Lady Mona ' (' Grace Darling ' × ' Symphony ') (votes 10 for, 3 against), from N. Prinsep, Esq., The Boxes, Pevensey Bay, Sussex. See p. 87.

Other Exhibits.

Messrs. Charlesworth, Haywards Heath : a group of Orchids.

Messrs. H. G. Alexander, Tetbury : a group of Orchids.

Messrs. McBean, Cooksbridge : a group of Orchids.

Messrs. Armstrong & Brown, Tunbridge Wells : a group of Orchids.

JANUARY 12, 1937.

CYPRIPEDIUM TROPHY COMPETITION.

The *Cypripedium* Trophy for the best exhibit of 25 plants of *Cypripedium*, species and/or hybrids, shown by an amateur was awarded to M. L. Wells, Esq., Chiddingfold, Surrey. (Gardener Mr. R. Buckman.)

Silver-gilt Grenfell Medal.

To Lieut.-Commander J. P. W. Furse, R.N., 10 Bramley Flats, Alverstoke, for an exhibit of Paintings of Fritillaries.

Grenfell Medal.

To Mr. A. G. Stubbs, 71 Berriedale Avenue, Hove, 3, Sussex, for an exhibit of Paintings of British Wild Flowers.

To Miss H. M. Coley, Sweetbriars, High Trees Road, Reigate, for an exhibit of Botanical Paintings of Fruits.

SCIENTIFIC COMMITTEE.—Mr. E. A. BOWLES, M.A., F.R.E.S., F.L.S., V.M.H., in the Chair, and eight other members present.

Germination of Acorns.—The question of the best means of packing acorns for transmission abroad was raised, and it was reported that good germination had been secured when the acorns were packed in damp sphagnum in a canvas bag, and also when they had been dipped in paraffin-wax before posting.

FRUIT AND VEGETABLE COMMITTEE.—Mr. E. A. BUNYARD, F.L.S., in the Chair, and thirteen other members present.

Exhibits.

Messrs. Bunyard, Maidstone : collection of Apples, and Apple ' D'Arcy Spice.'

Messrs. Cheal and Son, Crawley, Sussex : collection of Apples, and Apple ' Steyne's Seedling.'

Mr. W. F. Baker, Milton Road Nurseries, Cromer, Norfolk : Apple ' Charles Baker.'

Mr. R. Carrington-Willis, Bledlow Ridge, nr. High Wycombe, Bucks : Pear 'Christmas.'

R.H.S. Commercial Fruit Trials, Wisley : Apple 'Winter King.'

Mr. F. Streeter, Petworth Park Gardens, Petworth, Sussex : Apples 'Curl Tail,' 'Golden Delicious,' and 'Rome Beauty.'

Mr. C. J. Gleed, 78 St. Cross Road, Winchester : seedling Apple.

John Innes Horticultural Institute, Mostyn Road, 'Merton Park, S.W. 19 : seedling Apple No. 165.

FLORAL COMMITTEE A.—Mr. J. M. BRIDGEFORD in the Chair, and sixteen other members present.

Awards Recommended :—

Silver Banksian Medal.

To Ashington Nurseries, Ltd., Ashington, for Carnations and Chrysanthemums.

To Messrs. Engelmann, Saffron Walden, for Carnations, Pansies and *Euphorbia fulgens*.

To Messrs. Vinten, Balcombe, for Chrysanthemums.

Flora Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.

To Messrs. Carters Tested Seeds, Ltd., Raynes Park, for Primulas, Roman Hyacinths and *Iris tingitana*.

Banksian Medal.

To Messrs. Low, Enfield, for Carnations and other greenhouse flowers.

To Messrs. Wakeley, London, for Hyacinths.

Other Exhibits.

Messrs. Blackmore & Langdon, Bath : Blue Primroses.

Misses Hopkins, Coulsdon : Violets, Anemones, etc.

FLORAL COMMITTEE B.—Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and eighteen other members present.

Awards Recommended :—

Silver Banksian Medal.

To Messrs. Russell, Windlesham, for Azaleas, Camellias and other greenhouse plants.

Flora Medal.

To Mr. E. Ladhams, Elstead, for rock garden plants.

To Messrs. Reuthe, Keston, for greenhouse shrubs.

To Messrs. Stewart, Ferndown, for flowering shrubs and bulbous plants.

To the Horticultural College, Swanley, for Poinsettias, Coleus and other greenhouse plants.

Banksian Medal.

To Alpine Nurseries, West Moors, for rock garden plants.

To Messrs. Barr, Taplow, for Narcissi and other bulbous plants.

To Hocker Edge Gardens, Cranbrook, for Irises, Lachenalias and other bulbous plants.

To Mr. J. Klinkert, Richmond, for clipped Box trees.

To Messrs. Russell, Windlesham, for hardy shrubs.

To W. G. Theobald, Esq., Steyning, for species of *Adromischus* (Cotyledon) and *Pachyphytum*.

First Class Certificate.

To *Brownea* × *Crawfordii* as a flowering plant for the stove (votes unanimous), from the Director, Royal Botanic Gardens, Kew. See p. 130.

Award of Merit.

To *Euphorbia fulgens pallida* as a flowering plant for the stove (votes unanimous), from Messrs. Engelmann, Saffron Walden. See p. 131.

Preliminary Commendation.

To *Crinum Laurentii* as a flowering plant for the cool greenhouse (votes unanimous), from Mrs. J. B. Akroyd, Limsfield.

To *Scilla tubergeniana* as a hardy flowering plant (votes unanimous), from P. Rosenheim, Esq., East Molesey.

Cultural Commendation.

To Mr. W. Crossingham, gardener to Mrs. Vera Higgins, Croydon, for a pan of *Crassula columnaris*.

Other Exhibits.

Lieut.-Colonel C. H. Grey, Cranbrook : *Iris Bakeriana* (E.K.B. No. 2413).

Mr. R. Colpoys Wood, West Drayton : hardy shrubs.

ORCHID COMMITTEE.—Sir JEREMIAH COLMAN, Bt., in the Chair, and fifteen other members present.

Awards Recommended :—

Gold Medal.

To Dr. F. Craven Moore, " Duckyls," East Grinstead, for *Cypripediums*.

To Messrs. Armstrong & Brown, Tunbridge Wells, for *Cypripediums*.

Silver-gilt Flora Medal.

To Messrs. H. G. Alexander, Tetbury, for *Cypripediums*.

Silver Flora Medal.

To Guy P. Harben, Esq., Kings Somborne, for a group.

Silver Banksian Medal.

To N. Prinsep, Esq., " The Boxes," Pevensey Bay, for *Cypripediums*.

To M. L. Wells, Esq., Chiddingfold, Surrey, for *Cypripediums*.

First Class Certificate.

To *Odontoglossum* × 'Neron' var. 'Jean Campbell' ('Llewellyn' × 'Rosina') (votes 12 for, 3 against), from H. S. Wharton, Esq., "Shalston," Templewood Avenue, Hampstead. See p. 132.

Award of Merit.

To *Cypripedium* × 'King George VI' ('Chrysostom' × 'Hera') (votes 11 for), from Messrs. Armstrong & Brown, Tunbridge Wells. See p. 130.

To *Cypripedium* × 'Gatton Prince' ('Moonlight' × 'Walter Moore') (votes 13 for), from Sir Jeremiah Colman, Bt., Gatton Park, Reigate. See p. 130.

To *Odontonia* × 'Andromeda' var. 'Ruby' (*Odontoglossum* × 'St. James' × *Odontonia* × 'Duchess of York') (votes 8 for, 3 against), from Messrs. Charlesworth, Haywards Heath. See p. 132.

To *Cypripedium* × 'Diana Broughton,' Lynbrook var. ('Doris Black' × 'Grace Darling') (votes 10 for, 3 against), from H. P. Lawson, Esq., "Lynbrook," Knap Hill, Woking. See p. 130.

Other Exhibits.

Messrs. Charlesworth, Haywards Heath : a group of Orchids.

Mr. D. A. Cowan, Surbiton : a group of *Cypripediums*.

Mr. F. A. Greenfield, Horsham : a group of *Cypripediums*.

Messrs. McBean, Cooksbridge : a group of Orchids.

Messrs. Sanders, St. Albans : a group of Orchids.

Messrs. Stuart Low, Jarvis Brook : a group of Orchids.

Messrs. Harry Dixon, Wandsworth : a group of *Cypripediums*.

Messrs. A. J. Keeling, Bradford : a group of *Cypripediums*.

Sir William Cooke, Bt., Hampstead Norris : *Lycaste* × 'Ebor' (*lanipes* × *plana*).

Baron Bruno Schröder, The Dell Park, Englefield Green : well-flowered examples of *Laeliocattleya* × *Schroederæ*.

DONATIONS TO THE SOCIETY'S GARDENS AT WISLEY, 1936.

AITCHISON, Sir S., Alnwick; bulbs of yellow-flowered Snowdrop. ALGIERS, UNIVERSITY BOTANIC GARDEN; collection of seeds. ALLWOOD, Mrs., Edgware, Mddx.; plants and seeds of *Sempervivum* and *Sedum* species from Teneriffe. ALMA-ATA BOTANIC GARDEN, Kazakhstan, U.S.S.R.; collection of seeds. ANLEY, Mrs. G., Woking; plant of *Phyteuma pauciflorum*. ARMSTRONG, C. W., Vancouver, B.C.; plants of *Talinum Wayae* and hybrid *Pentstemon*. ARNOLD ARBORETUM, Jamaica Plain, Mass., U.S.A.; collection of seeds. BAKER, G. P., Sevenoaks, Kent; plants of *Iris* species; seeds of *Paeonia cretica* and of several shrubs. BAKU BOTANIC GARDEN, U.S.S.R.; seeds of *Arum*, *Iris* species, *Juniper* and *Prunus*. BALFOUR, A. P., c/o Messrs. Sutton, Slough; seeds of *Iris* species. BALLS, E. K., Knebworth, Herts; seeds of *Tulipa* sp. from Persia; plants of *Ranunculus calandrinoides* and *Sempervivum atlanticum*. BALME, Prof. J., Mexico; seeds of *Prunus serotina* var. *salicifolia*. BARKER, E. J., Ipswich; plants of *Aconitum Wilsonii*, Barker's var. BARNES, H., Vancouver, B.C.; seeds of *Gilia aggregata* and *Lewisia*. BARR, P. R., Oxhey; plants of *Iris japonica*, Ledger's var. BARRES, DOMAINE DES, Nogent-sur-Vernisson, France; collection of tree and shrub seeds. BATH, Messrs. R. H., Wisbech; Daffodil bulbs. BEAUCHAMP, Lady, Stroud, Glos.; plant of hybrid Primrose. BELGRADE, UNIVERSITY BOTANIC GARDEN, Jugo-Slavia; collection of seeds. BELL, Miss M., Bayside, Long Island, U.S.A.; plants of *Convallaria majalis* var. *rosea*. BENARY, E., Erfurt, Germany; seeds of white *Delphinium* from East Africa. BENTLEY, W., Burghclere, Newbury; seeds of *Meconopsis* species; plants of *Lewisia pygmaea* form, and *Ourisia microcarpa*. BERESFORD, Lt.-Col. H. PACK-, Headley, Hants; seeds of *Rhododendron* hybrids; bulbs of Queen Anne's Daffodil; plants of *Cistus* sp.; *Rhododendron* 'Henry Beresford'; *Sorbus* sp. BERGIAN BOTANIC GARDEN, Stockholm; collection of seeds. BERKELEY, Mrs., Hanwell Castle, Banbury; seeds of *Sparaxis* × *Sreptanthera*, Krige's hybrids. BERKELEY, R. G., Spetchley Park, Worcester; plants of *Allium*; *Clematis florida* var. *Sieboldii*; *Sonchus cervicornis*. BERLIN-DAHLEM BOTANIC GARDEN; collection of seeds. BEVAN, Dr. R., St. Thomas's Hospital, S.E. 1; seed of *Iris rosenbachiana*. BISIKER, Mrs. H., Ashstead, Surrey; plant of *Arum Dracunculoides*. BLOSSFELD, R., Potsdam, Germany; seeds of *Primula malacoides* 'Dr. Boehnert'. BODDAM-WHATHAM, Mrs., Gum Tree, O.F.S., S. Africa; seeds from Namaqualand. BOND, W. L., Addis Ababa, Abyssinia; collection of native seeds. BONN BOTANIC GARDEN, Germany; seeds of alpine plants. BOOTHMAN, H. S., Furze Platt, nr. Maidenhead; plants of *Aquilegia saxemontana*, *Campanula lasiocarpa alba*, *Gilia umbellata*, and *Primula Parryi*. BRAGGINS, S. W. McL., Bordighera, Italy; seeds of *Campanula Allionii*, *Lobelia* sp., *Primula* spp. BRIDGEFORD, J. M., London, W.C. 2; corms of *Gladiolus coccineus*; collection of seeds of annuals. BRIGGS, Miss, Crown Hill, Plymouth; plants of *Grevillea* × *semperflorens*. BRITISH COLUMBIA, UNIVERSITY OF, Vancouver; collection of seeds. BRITTEN, H. A., Cuckfield, Sussex; seeds of *Aquilegia* 'Hensol Harebell'. BROOKES, Miss, Dursley, Glos.; Primrose with foliaceous calyx. BROOKLYN BOTANIC GARDEN, N.Y. U.S.A.; collection of seeds. BROWN, F. C., Wisley; bulbs of *Iris reticulata* 'Cantab'; cuttings of *Mesembryanthemum* sp. BRYNE, A., Stavanger, Norway; bulbs of wild Daffodils from Hardanger. BUDA-PEST, UNIVERSITY BOTANIC GARDEN; collection of seeds. BULSTRODE, Mrs. C. V., Salt Hill, Chichester; seeds of *Antigonon* sp. from Ceylon; of *Sophora tetraptera* and *Leptospermum* sp. from Norfolk Island. BUNBURY, Sir CHARLES, Barton; books for the Library. BUNYARD, Messrs. G., Maidstone; collection of old Roses and *Rosa* species. BURGESS, Col. R., at Kingsley Green, nr. Haslemere; collection of seeds of alpine plants from Kashmir. BURGYN, C., Chilworth, Surrey; seeds of creeping *Lapageria* from Chile. BURKWOOD & SKIPWITH, Messrs., Kingston-on-Thames; plants for rock garden. BURPEE, W. ATLEE, Philadelphia, U.S.A.; seeds of *Nasturtiums*. BURRA, A., Fordingbridge, Hants; seeds of *Ranunculus Lyallii*. BUTLER Mrs. M., Cobham, Surrey; seedlings of *Verbena bonariensis* and *Ranunculus creticus* var. *albus*; plants of *Nepeta Mussinii* and *Lilium speciosum*; cuttings of *Berberis acuminata*. BUXTON, Mrs. M., Wootton Bassett, Wilts; seeds of scarlet Mistletoe. BYNG OF VIMY, Viscountess, Thorpe-le-Soken, Essex; Rose

'Belle of Portugal.' CANEN, L., Marlow, Bucks; plants of *Clematis hansenii* and *Solanum sodomaeum*; seeds from Morocco. CALGARY, PARKS SUPERINTENDENT OF, Canada; collection of seeds. CALLAN, F., Bramhall, Cheshire; seeds of *Passiflora edulis*. CAMBRIDGE, UNIVERSITY BOTANIC GARDEN; collection of seeds. CAMERON, Dr. A., Dartford, Kent; collection of shrub seeds. CAMPBELL, D., Regent's Park, N.W. 1; collections of herbaceous plants. CANE, Sir J. DU, Eton Green, Godalming; bulbs of *Iris Sisyrinchium*. CARTERS TESTED SEEDS, Raynes Park, S.W. 20; collection of seeds of greenhouse plants. CAVE, Mrs., Wandsworth Common, S.W. 12; seeds of *Petroselinum*. CHANDLER, E. T., Broadbridge Heath, Horsham; plant of *Daphne odora* var. *variogata*. CHAPPELL, Miss, Box, Wilts; plants of *Berberis vulgaris* var. *asperma*. CHARRINGTON, E., Limpsfield, Surrey; plant of *Phyllocactus* sp., and collection of Border Carnations. CHITTENDEN, F. J., R.H.S., Vincent Square, S.W. 1; plant of *Olearia Forsteri*; seeds of *Camellia Sasangua*, *Disporum*, *Smilacina*, *Tilia Miqueliana*, and *Thunbergia Gibsonii*. CHRISTCHURCH BOTANIC GARDEN, N.Z.; collections of seeds; CLOUSTON, Mrs., Wimbledon, S.W.; plants of *Primula scotica*. COIMBRA, UNIVERSITY BOTANIC GARDEN; collection of seeds. COOKE, R. B., Corbridge-on-Tyne; collections of seeds of alpine and other plants; collection of plants. COPELAND, T., Finchampstead, Berks; plants of *Primula carniolica*; seeds of *Anemone magellanica* and *Primula* species. COPELAND, W. F. M., Southampton; bulbs of abnormal *Fritillaria*. COPENHAGEN BOTANIC GARDEN; collection of seeds. CORREVON, Dr. H., Chêne-Bourg, Geneva; collection of seeds of alpine plants; collection of alpine plants. CORRY, Lady W. LOWRY-, Enniskillen, N. Ireland; cuttings of Roses 'Fortune's Yellow' and 'Catherine Mermet.' COWAN, Dr. J. M., Royal Botanic Garden, Edinburgh; seeds of *Prunus Puddum*. COX, E., Valemount P.O., B.C.; seeds of dwarf *Gaillardia*. CRABB, C., Vancouver, B.C.; roots of *Erythronium* sp. and *Trillium* sp. CRANE, Dr. F. D., Johns Hopkins University, Baltimore, U.S.A.; seeds of *Celastrus scandens*, *Diospyros virginiana*, and *Papaver radiculatum*. CUNNINGTON, C., Wragby, Lincs.; trees of Plum 'Lindsey Gage.' CURWEN, Rev. R. B., Arundel, Sussex; seeds of *Eremurus* species. DALRYMPLE, G. H., Bartley, nr. Southampton; cuttings of *Rosa filipes* and *Rosa multiflora forma*; seeds of *Allium azureum*. DALY, Sir H., Ryde, I.O.W.; seeds of several *Hibiscus* varieties. DENHAM, Dr. H., Kidlington, Oxford; plants of *Populus suaveolens*; *Salix* sp., and *Primula* 'Beatrice Lascaris'; seeds of *Allium giganteum*. DESBOROUGH, Mrs., Broadstone, Dorset; seeds of *Gentiana Pneumonanthe*. DICKINSON, Miss, St. Albans; plant of *Geum rivale*. DOBBIN, Mrs. M. A., Blackshills, N.B.; collection of seeds. DRESDEN BOTANIC GARDEN, Germany; collection of seeds. DUNEDIN BOTANIC GARDEN, N.Z.; collection of seeds. DURHAM, F. R., R.H.S., Vincent Square, S.W. 1; seeds of *Hedychium Gardnerianum*; of *Loofa* from Teneriffe. EARLE, Mrs., Busbridge Hall, Godalming; pans of South African succulent plants. EASLEA, Messrs. W., Leigh-on-Sea, Essex; plants of Roses 'Easlea's Golden Rambler,' 'Melita,' and 'Lal.' EASTERFIELD, F., Edenbridge, Kent; cuttings of seedling *Pelargoniums*. EDINBURGH ROYAL BOTANIC GARDEN; collections of seeds, including large sending from China; plants for rock garden; plants, seeds, and bulbs from E. K. Balls' expedition to Morocco. EDWARDS, J. E., Gibraltar; bulbs of *Narcissus viridiflorus*. EGAR, H. E., 47, Quentin Road, S.E. 13; bulbs, probably *Zephyranthes* sp. ELLIOTT, C., Stevenage, Herts; seeds of *Physalis ixocarpa*; plants of *Saxifraga* 'Kathleen Pinsent,' *Oenothera* 'Six Hills Hybrid.' ENGELMANN, Messrs. C., Saffron Walden; plants of Pansies. ERSKINE, Capt. E., British Consulate, Khartoum, Sudan; seeds of Abyssinian plants. FANE, C. A., Oxted, Surrey; plants of *Iris unguicularis alba*. FELLOWS, Miss E., Palace Gate, Kensington, W. 8; bulbs of *Scilla sibirica* var. 'Fra Angelico.' FENWICK, G. N., Luffenham Hall, Stamford; seeds of *Anemone Pulsatilla*, *Buda-Pest* var. FENWICK, M., Stow-on-the-Wold, Glos.; seeds of *Meconopsis integrifolia*; plants of *Kirengeshoma*, *Ramondia*, and *Stylophorum*; cuttings of *Pentstemon Newberryi*. FINDLAY, R., Wisley; plants of *Rubus Chamaemorus*. FOGWILL, Messrs., Guildford; boxes of seedlings Cinerarias and Primulas. FOREMAN, Miss, West Norwood, S.E.; seeds of *Jacaranda*. FORSYTH, H. G., Pietermaritzburg, Natal; plant of *Begonia Sutherlandii*. FOSTER-MELLIAR, R. A., Bude, Cornwall; seedling tree for identification. FREIBURG BOTANIC GARDEN, Germany; collection of seeds. FUNGE, J. W., Cahir, Co. Tipperary, I.F.S.; plants of *Cladrastis* species. GAME, Lady, Ham Common, Surrey; seeds of *Actinotus Helianthi*. GARDNER, Hon. Mrs. A., Worplesdon, Surrey; seeds of *Hibiscus Sabdariffa*, and *Thladiantha Oliveri* hybrid. GARNETT-BOTFIELD, Mrs., Albrighton, Wolverhampton; plants of *Rhodohypoxis Baurii*, and var. *platypetala*.

(To be continued.)

EXTRACTS FROM THE PROCEEDINGS

OF THE

ROYAL HORTICULTURAL SOCIETY.

NOTICES TO FELLOWS.

SUBSCRIPTIONS.

There are still some Fellows of the Society whose subscriptions are outstanding. A special reminder will be sent out during this month in view of the Great Spring Flower Show at Chelsea in May, but it would be a considerable help if Fellows whose subscriptions are in arrear would forward them as soon as possible.

CHELSEA SHOW.

The Chelsea Flower Show will be held in the grounds of the Royal Hospital, Chelsea, on May 26, 27 and 28. Special arrangements have again been made with the Automobile Association in conjunction with the Police for the direction of traffic and parking of cars, and a leaflet will be issued with the May JOURNAL containing a plan of the district showing traffic arrangements and parking places.

Fellows are reminded that the most crowded hours at this Show are invariably between noon and half-past four, and if they wish to enjoy their visit to the full they are advised to go either before or after those hours.

RAILWAY FACILITIES.

The Society has been informed by the Railway Clearing House that there are numerous cheap fare facilities in operation to London at the time of the fortnightly and special Shows, of which Fellows can take advantage. In addition, by prior arrangement with the railway company concerned, parties of not less than eight adults travelling together will be issued tickets, available on the day of issue only, at the ordinary single fare for the double journey, fractions of 1*d.* being reckoned as 1*d.* third class; first-class fares 50 per cent. over the third-class fares. Persons travelling with these day tickets from distances over 150 miles may commence the outward journey before midnight, but not earlier than 9.0 P.M. the previous day.

For Fellows in the North of England special night bookings are in operation between specified stations in the North of England and London, by certain services each night at the ordinary single fare for the double journey, available for return by specified night trains within 17 days of the date of issue.

For further particulars in regard to these facilities Fellows are asked to apply at their railway stations. Any further information which the Society may receive from the Railway Clearing House will be published in these notes.

EMPIRE EXHIBIT.

To celebrate the Coronation, there will be at Chelsea Show an exhibit representing the contributions made to horticulture by the floras of the various parts of His Majesty's Empire overseas. The project has the approval of the Secretary of State for the Colonies and the High Commissioners for the Dominions, all of whom have very kindly nominated representatives to act on the organizing committee. The authorities overseas have willingly promised their active support, and already plants or seeds have arrived from Canada, South Africa, Bahamas, Bermuda, British Guiana, Cyprus, Falkland Islands, Gambia, Gold Coast, Malta, Mauritius, Newfoundland, St. Helena, Sierra Leone, Windward Isles, Zanzibar, Nyasaland, Palestine and Hong-Kong.

xlvi PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

The organization of an exhibit of this sort is naturally attended by considerable difficulties, owing largely to the great distances which the plants have to travel and the short time available for their preparation after arrival. The greatest possible assistance is being received from the Director and Curator of the Royal Botanic Gardens at Kew, where most of the imported plants are being cared for. The Society is also greatly indebted to a number of amateurs and horticultural traders who, upon being approached, have willingly undertaken to augment the plants received from overseas. It is believed that the resulting Empire Exhibit will be an outstanding feature of the Show, and a special attraction to the visitors from the Dominions and Colonies who will be in London for the Coronation.

SPECIAL AWARDS AT CHELSEA SHOW.

In order to encourage exhibitors to provide especially fine displays at the Chelsea Show in this Coronation year, the Council has decided that every exhibitor who is awarded the Society's Gold Medal shall also receive a Silver-gilt cup.

DAFFODIL SHOW.

Fellows' attention is drawn to the Daffodil Show, which is to be held on Thursday and Friday, April 15 and 16, in the New Hall. Schedules for the competitive classes of this Show are obtainable from the Secretary, the closing date for entries being April 10.

EARLY MARKET PRODUCE SHOW.

The attention of Fellows is also drawn to the Early Market Produce Show, which is to be held on Thursday and Friday, April 15 and 16, in the Old Hall. This Show will be the sixth of its kind. Each year shows an increased interest on the part of market growers, and there is no reason to doubt that the Show will be as good as, if not better than, any other of its kind.

On Thursday afternoon, April 15, at 3.30 in the Lecture Room, Dr. G. E. Friend will lecture on "Vegetables as an Article of Diet," and after he has spoken an opportunity will be given for a general discussion on the subject. All interested in Dietetics are invited to hear the lecture.

CALENDAR.

April 6, 12 noon to 7.30 P.M.—Fortnightly Meeting and Show of Flowers in season.

At 3.30 P.M., on April 6, in the Lecture Room of the New Hall, Dr. W. B. TURRILL will give a lecture on "Fritillaries."

April 7, 10 A.M. to 5 P.M.—Fortnightly Meeting and Show of Flowers in season, continued.

April 7, 3.30 P.M., in the Lecture Room of the New Hall, Mr. J. E. GRANT WHITE will give a lecture, under the auspices of the Institute of Landscape Architects, on "The Planning of a Small Garden."

Entries for the Early Market Produce Show should reach the Secretary not later than *April 7*.

April 7, from 2 to 4 P.M.—Demonstrations at Wisley on the Spraying of Fruit Trees and the Pruning of Shrubs.—See p. xlvii.

April 8, 2 to 4 P.M.—Demonstrations at Wisley on the Spraying of Fruit Trees and the Pruning of Shrubs.—See p. xlvii.

April 10.—Entries for the Daffodil Show should reach the Secretary not later than this date.

April 15, 1 to 7.30 P.M.—Daffodil Show in the New Hall, and Early Market Produce Show in the Old Hall.—See above.

At 3.30 P.M., on April 15, in the Lecture Room of the New Hall, Dr. G. E. FRIEND will give a lecture on "Vegetables as an Article of Diet."

April 16, 10 A.M. to 5 P.M.—Daffodil Show and Early Market Produce Show, continued.

April 20, 12 noon to 7.30 P.M.—Fortnightly Meeting and Show of Flowers in season. On this occasion there will be a competition for the Odontoglossum Trophy.—See p. xlvii.

The Alpine Garden Society's Spring Show and the National Primula and Auricula Society's Annual Show will be held in conjunction with the Society's Show. Both Halls will be used.

At 3.30 P.M., on April 20, in the Lecture Room of the New Hall, Mr. H. F. R. MILLER will give a lecture on "Sempervivums," and at 4.30 P.M., in the Restaurant

of the Old Hall, there will be a meeting of the Iris Group, at which Mr. G. P. BAKER will give a lecture on "The Cultivation of Iris Species."—See p. 14.

April 21, 10 A.M. to 5 P.M.—Fortnightly Meeting and Show of Flowers in season, and also the Alpine Garden Society's and the National Primula and Auricula Society's Shows, continued.

April 24.—The written part of the Examination for the National Diploma in Horticulture will be held throughout the country.

April 27, 1 to 7.30 P.M.—British Carnation Society's Spring Show in the Old Hall. Joint Perpetual-Flowering Carnation Committee will meet at 12 noon.

April 28, 10 A.M. to 5 P.M.—British Carnation Society's Spring Show, continued.

May 4, 12 noon to 7.30 P.M.—Fortnightly Meeting and Show of Flowers in season in the New Hall. On this occasion there will be a competition for the Sewell Medals.—See below.

May 4, 1 to 7.30 P.M.—Rhododendron Association's Show in the Old Hall.

At 3.30 P.M., on *May 4*, in the Lecture Room of the New Hall, Mr. F. C. PUDDLE will give a lecture on "Hybrid Rhododendrons."

May 5, 10 A.M. to 5 P.M.—Fortnightly Meeting and Show of Flowers in season, and Rhododendron Association's Show, continued.

May 26 to 28.—Chelsea Flower Show in the Royal Hospital Grounds, Chelsea.—See special notice, p. xlv.

DEMONSTRATIONS AT WISLEY.

Weather permitting, the following demonstrations will be given in April :

Spraying Fruit Trees, on April 7 and 8.

Shrub Pruning, on April 7 and 8.

These demonstrations will take place between 2 and 4 P.M. Fellows who intend to be present at a demonstration should notify the Director, R.H.S. Gardens, Wisley, Ripley, Surrey, beforehand, so that adequate arrangements may be made.

ODONTOGLOSSUM TROPHY.

At the Fortnightly Show on April 20 and 21, a trophy is offered for an exhibit of 25 plants of *Odontoglossum*, species and/or hybrids, shown by an amateur. Hybrids with other genera will be admissible—*e.g.* *Odontioda*, *Odontonia*, etc.

Entries must be made on special forms obtainable from the Secretary, by whom the completed forms must be received not later than by the first post on the Wednesday preceding the Show.

SEWELL MEDALS.

At the Fortnightly Show on May 4 two Sewell Medals will be offered for award. One is offered for an amateur's exhibit of three pots or pans not exceeding 12 inches in diameter if circular, or 112 square inches in internal area if rectangular; the other is offered for a horticultural trader's exhibit of six pots or pans subject to the same restrictions as to dimensions. Only one subject may be shown in each pot or pan, but it is not necessary that the plants should have been grown in the receptacles in which they are shown; if desired, plants may be lifted and potted for the purposes of the competition. Not fewer than two-thirds of the plants in each exhibit must be in bloom, and plants which are not in bloom should possess decorative value when shown. The scale of points for judging will be as follows: Suitability, 24 points; rarity, 18 points; cultivation, 24 points.

Entries must be made on special forms obtainable from the Secretary, by whom the completed forms must be received not later than by the first post on Wednesday, April 28.

HALL LETTINGS.

From May 24–28 the Dental Trade Exhibition will be held in the Society's Old and New Halls. If any Fellows are interested in this exhibition, they are asked to write to the organizer, G. W. MARTIN, Esq., 1 Warwick Street, Regent Street, W. 1, from whom all particulars may be obtained.

BEQUEST TO THE SOCIETY.

The Society has received a munificent bequest under the will of the late Dame Julia Mary Tilden, widow of Sir William Tilden, the renowned chemist, of £500. It is needless to say that such a bequest is not only of great practical use to the Society, but it also gives great encouragement.

NATIONAL SHOW OF THE AMERICAN PÆONY SOCIETY, NEBRASKA.

The President of the Garden Club of Lincoln, Nebraska, wishes us to draw the attention of Fellows to a Pæony Conference and Show to be held in Lincoln, Nebraska, on July 12 and 13. She would be very pleased to help any Fellow who desires to visit this Show, and asks them to write to :

The President, Garden Club of Lincoln, 2056 South Eighteenth Street, Lincoln, Nebraska.

WISLEY IN APRIL.

With the coming of April the Gardens enter upon a period, extending usually until the end of June, when there is an almost daily increase in the number and variety of plants either flowering or about to do so. It is only possible in this note to indicate a few of the more notable displays, but visitors will find very many other plants of beauty or interest in all the departments of the Gardens, both under glass and out of doors.

In the Half-hardy House is the shrubby mauve *Prostanthera rotundifolia*, and the lighter coloured allied species *P. Sieberi*, the lavender *Veronica Hulseana*, *Calceolaria violacea*, and the lovely white *Paeonia cretica*. The adjoining House will probably contain hybrid *Calceolarias* and *Schizanthus* grown in pots, whilst in the Temperate House are the scarlet or yellow " Bottle-brushes " (*Callistemon*), climbing blue-flowered *Hardenbergia*, the brilliant *Columnea Banksii*, tall species of *Begonias*, and that striking evergreen *Macleania insignis*.

The Alpine House this month will contain a great number of choice or difficult alpine plants showing at their best under these protected conditions ; such for example as *Androsaces*, *Primulas*, both European and Asiatic, the latest-flowering *Saxifrages*, *Cassiope lycopodioides*, *Shortia* and *Schizocodon*, *Orchis* species, *Armeria caespitosa*, and so on to attract those who cultivate these gems. In the beds by the Alpine House is the collection of *Tulipa* species.

On the Rock Garden proper the dwarf species of *Rhododendron* are chiefly in bloom this month, accompanied by numerous *Primulas*, and in the Bog Garden the giant yellow American aroid *Lysichiton*. Elsewhere are *Anemone Pulsatilla*, the bright blue *Pulmonaria angustifolia*, and various species of *Daphne*.

Passing into the Wild Garden visitors should see a variety of colour forms of *Camellia japonica*, *Trilliums*, white and pink, *Primula denticulata* if not yet over, *Rhododendrons*, several species of *Corylopsis* with dangling yellow tassel-like inflorescences, *Magnolia stellata*, *Primula chungensis* and *P. chionantha*, groups of *Shortia galacifolia* carpeting the ground, and perhaps the yellow *Meconopsis integrifolia*.

In the Heath Garden the forms of *Erica mediterranea*, especially *superba* and ' Brightness,' together with *E. australis*, its white variety ' Mr. Robert,' and the white *E. arborea alpina* all help to maintain the reputation of this family for a long period of bloom.

Of the trees and shrubs which we expect to see at this season the most attractive and beautiful are the many species of *Prunus*, especially the numerous Japanese Cherries : *P. incisa* which is so suitable for small gardens on account of its dwarf habit and the clear pink *P. Sargentii*, another first-class small tree. In addition to these are the richly-coloured forms of *Cydonia japonica*, the earlier species of *Spiraea* and *Berberis*, *Pyrus* and *Malus*, whilst among them all are planted a very large number of different varieties of *Daffodils* of the various sections to add colour to the scene for several weeks. It may be mentioned that the new avenue which traverses the hill above the Laboratory is bordered by other Japanese Cherries, which will require a few years before reaching maturity.

In the Award of Merit Garden notable spectacles in April are the old trees of *Prunus subhirtella pendula*, the double wild Cherry (*P. Avium plena*), and vigorous examples of *P. incisa* and *Magnolia Soulangeana*, whilst a big specimen of *Berberis* × *stenophylla* in front of the Vinery invariably flowers magnificently.

Owing to the mildness of the winter, up to the time of writing this notice, there will probably be found in flower many shrubs which usually bloom at a later date.

GENERAL MEETINGS.

JANUARY 26, 1937.

Silver Grenfell Medal.

To Lieut.-Commander J. P. W. Furse, R.N., 10 Bramley Flats, Alverstoke, for an exhibit of Water-colour Paintings of Fritillaries.

Grenfell Medal.

To Miss E. Sartain, Rosemary, Fairlight Avenue, Telscombe Cliffs, Sussex, for an exhibit of Water-colour Paintings of Fritillaries.

A lecture was given by Mr. A. D. C. LE SUEUR on "The Care of Ornamental Trees" (p. 141). Chairman, Mr. F. R. S. BALFOUR, M.A., D.L., J.P., V.M.H.

SCIENTIFIC COMMITTEE.—Mr. E. A. BOWLES, M.A., F.R.E.S., F.L.S., V.M.H., in the Chair, and seven other members present.

Cross-pollination in orchards.—Mr. C. H. Hooper reported the results of his experiments in cross-pollination of various fruits during 1936. He found that among apples Cox's Orange Pippin set with pollen of 17 of the varieties tried—viz. Sturmer Pippin, High Canons, Stirling Castle, James Grieve, Lord Lambourne, Christmas Pearmain, Arthur Turner, Cox's Pomona, Early Victoria, Lady Sudeley, Renown, Rev. W. Wilks, Golden Spire, Lord Derby, Ontario, Laxton's Pearmain and Worcester Pearmain, but failed to set with 26 others, including Bramley's Seedling and Crimson Bramley. The following set with Cox's Orange Pippin pollen: Rival, Worcester Pearmain, Stirling Castle, Bramley's Seedling, Lady Sudeley, Grenadier, High Canons, Allington Pippin, Ellison's Orange. Several other successful crosses were reported, and Laxton's Superb, American Mother, Golden Spire and Rev. W. Wilks proved self-fruitful to some extent.

Among plums, Czar and Victoria while self-fruitful set better when reciprocally crossed, and Czar also with Purple Pershore and Wyedale.

Of pears Doyenné du Comice set with Le Lectier, Santa Claus and Craig's Favourite, while its pollen set Santa Claus, Beurré Superfin, Marie Louise and Beurré Hardy.

Insect attacks.—Mr. G. Fox Wilson showed a burr from the stem of the Vine Golden Queen with the larvæ of the vine weevil feeding in it. He also showed the burrow of a goat moth caterpillar in an oak stem and embedded in the burrow the empty shell of a hazel-nut, possibly placed there by a nut-hatch.

Crocus Sieberi albus.—Mr. Bowles showed a white-flowered seedling of *Crocus Sieberi* which he had raised. The plant was vigorous, free of increase, and showed no purple in the flowers, which were larger than the normal form (see p. 130).

Variegated maize cobs (Rainbow Maize).—Mr. Engelmann of Saffron Walden showed on behalf of Messrs. La Montagne of Woburn, Mass., a series of maize cobs containing grains of a variety of colours varying from white to black through yellow and red with some of a purplish hue. Messrs. La Montagne write:

"Coloured Indian Corn is not new. However, this particular strain is new, as we have been working on it for a period of five years with definite objectives in view. We first obtained this corn from Mexico, where it is a staple food product of the native Indians. We found it coarse, with indented kernels and ears of many sizes. Due to its long season of growth and mostly black, blue and yellow and white kernels, it was not especially decorative when dried. We obtained some from our Uti Indians of Utah which contained much red, especially the very dark, almost black, red. Also corn from the Hopi Indians of Arizona which contained some beautiful mottled ears. To shorten the season of maturity and to work toward a kernel which would not indent upon drying we crossed this corn with our local field flint corn (*Zea indurata*). This gave us improvement, but to reduce the size of the kernel and to impart a lasting pearly appearing kernel we crossed again with pop corn (*Zea everta*). We have now, we feel, fixed this material, giving a medium-sized ear of beautiful appearance which matures much earlier and is far freer from smut-disease, etc."

A Certificate of Appreciation was recommended to Messrs. La Montagne.

FRUIT AND VEGETABLE COMMITTEE.—Mr. E. A. BUNYARD, F.L.S., in the chair, and thirteen other members present.

Awards Recommended:—*Silver Knightian Medal.*

To Messrs. Sutton, Reading, for a collection of Vegetables.

I PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

Other Exhibits.

- Mr. E. A. Bunyard, Allington, Maidstone : Apple 'Golden Delicious.'
R.H.S. Commercial Fruit Trials, Wisley : Apple 'Stonetosh.'
Miss B. C. Thornycroft, The Moorings, Bembridge, Isle of Wight : Apples
'Father's Pippin' and 'Jersey Beauty' ?
Major K. Willet, South Cadbury House, Nr. Yeovil, Somerset : Apple
'Camelot.'
Imperial Fruit Show Ltd. : samples of fruit from the Palestine Citrus Fruits
in Season Exhibit.

FLORAL COMMITTEE A.—Mr. J. M. BRIDGEMAN in the Chair, and twelve
other members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Messrs. Carters Tested Seeds, Raynes Park, for Primulas.

Silver Flora Medal.

To Ashington Nurseries, Ashington, for Carnations.

To Messrs. Blackmore & Langdon, Bath, for Cyclamens.

To Messrs. Engelmann, Saffron Walden, for Carnations, Antirrhinums,
Euphorbias, etc.

Silver Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.

Flora Medal.

To Messrs. Napier, Taunton, for Carnations.

Banksian Medal.

To Messrs. S. Low, Enfield, for Carnations.

To Messrs. Ryder, St. Albans, for Primulas.

To Messrs. Wakeley, London, for Hyacinths.

Selected for trial at Wisley.

Primula sinensis 'Double Dazzler,' from Messrs. Hurst, London.

Other Exhibits.

Mrs. Rushbrooke, Hatfield : *Hippeastrum* 'Grania.'

Messrs. Ryder, St. Albans : *Primula stellata* 'Samuel Ryder.'

FLORAL COMMITTEE B.—Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and
seventeen other members present.

Awards Recommended :—

Silver Banksian Medal.

To Messrs. Cheal, Crawley, for flowering shrubs.

To Messrs. Russell, Windlesham, for flowering and evergreen shrubs.

Flora Medal.

To Messrs. Barr, Taplow, for Narcissi and other bulbous plants.

To Brookside Nurseries, Oxford, for Saxifrages.

To Hocker Edge Gardens, Cranbrook, for bulbous plants.

To Mr. E. Ladhams, Elstead, for rock garden plants.

To Messrs. Neale, Worthing, for succulents.

To Messrs. Stewart, Ferndown, for rock garden plants and shrubs.

To Messrs. Wood, Taplow, for rock garden plants.

Banksian Medal.

To Messrs. Hillier, Winchester, for flowering and evergreen shrubs.

To Mr. J. Klinkert, Richmond, for clipped Box trees.

To Mr. L. Lawrence, Taplow, for succulents.

To Messrs. Stuart Low, Enfield, for greenhouse shrubs.

To Messrs. Maxwell & Beale, Broadstone, for rock garden plants.

To Walton Park Nurseries, Walton, for flowering shrubs.

Award of Merit.

To *Crocus Sieberi albus* as a hardy flowering plant (votes unanimous), from
E. A. Bowles, Esq., Waltham Cross. See p. 130.

To *Helleborus Kochii* as a hardy flowering plant (votes 14 for), from G. P.
Baker, Esq., Sevenoaks. See p. 131.

To *Nephrolepis Hillii* as a greenhouse fern (votes 11 for), from Messrs. J. Hill
& Son, Edmonton, N. 9. See p. 132.

To *Rhododendron* × 'Fulgarb' as a hardy flowering shrub (votes 9 for),
from E. J. P. Magor, Esq., St. Tudy, Bodmin. See p. 132.

To *Viburnum grandiflorum* as a hardy flowering shrub (votes 11 for), from
Lord Aberconway, Bodnant. See p. 133.

Other Exhibits.

Alpine Nurseries, West Moors : rock garden plants.

G. P. Baker, Esq., Sevenoaks : *Crocus Sieberi versicolor*, *C. veluchensis*, *C. chrysanthus* 'Zwanenberg Bronze.'

Messrs. Burkwood & Skipwith, Kingston : flowering shrubs.

Messrs. Garways, London, W. 2 : succulents.

Miss Hopkins, Coulsdon : rock garden plants.

E. J. P. Magor, Esq., St. Tudy, Bodmin : *Rhododendron grande* early flowering form.

W. S. Mitford, Esq., Petworth : *Ophrys fusca*.

Messrs. Russell, Windlesham : *Rondeletia cordata*.

Messrs. John Waterer, Sons & Crisp, Bagshot : rock garden plants.

Mr. R. Colpoys Wood, West Drayton : shrubs.

Messrs. Wood, Taplow : Primula 'Ravensthorpe.'

ORCHID COMMITTEE.—Sir JEREMIAH COLMAN, Bt., in the Chair, and eleven other members present.

Awards Recommended :—*Silver Banksian Medal.*

To Messrs. Armstrong & Brown, Tunbridge Wells, for a group.

To Messrs. Charlesworth, Haywards Heath, for a group.

Award of Merit.

To *Cypripedium* × 'Angel Luscombe' var. 'Ceylon' ('Cardinal Mercier' × 'Chardmoore'), (votes unanimous), from Messrs. Armstrong & Brown, Tunbridge Wells. See p. 130.

Other Exhibits.

Messrs. McBean, Cooksbridge, a group.

Messrs. Stuart Low, Jarvis Brook : a group.

JOINT ROCK GARDEN PLANT COMMITTEE.—Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and six other members present.

Awards Recommended :—*Award of Merit.*

To *Primula* 'Schneekissen' as a flowering plant for the rock garden (votes 6 for), from Messrs. Wood, Taplow. See p. 132.

To *Viburnum fragrans nanum* as a hardy flowering shrub for the rock garden (votes 6 for), from Messrs. Elliott, Stevenage. See p. 133.

Other Exhibit.

Messrs. Wood, Taplow : Primula 'Ravensthorpe.'

FEBRUARY 9, 1937.

Silver-gilt Grenfell Medal.

To Mr. B. J. Beckton, The Manor House, Tytherington, for an exhibit of Photographs of Masdevallias.

Silver Grenfell Medal.

To Miss F. L. Bunyard, Newland, Guildford Road, Horsham, for an exhibit of Water-colour Paintings of Fruit.

To Lieut.-Commander J. P. W. Furse, R.N., 10 Bramley Flats, Alverstoke, for an exhibit of Water-colour Paintings of Terrestrial Orchids.

Grenfell Medal.

To Miss H. M. Coley, Sweetbriars, High Trees Road, Reigate, for an exhibit of Drawings and Paintings of Flowers.

To Miss G. Thomasset, 11 St. Mildred's Road, Lee, S.E., for an exhibit of Water-colour Paintings of Flowers.

To Miss W. Walker, 25 Tanza Road, Hampstead, N.W. 3, for an exhibit of Water-colour Paintings of Flowers.

A lecture was given by Mr. J. COUTTS, V.M.H., on "Plants for the Cool Greenhouse." Chairman, Mr. L. NOEL SUTTON.

SCIENTIFIC COMMITTEE.—Mr. E. A. BOWLES, M.A., F.L.S., F.R.E.S., V.M.H., in the Chair, and eight other members present.

Manganese in soil.—Dr. Voelcker referred again to the peculiar soil from the Isle of Wight in which he had found 3½ per cent. manganese oxide. He had failed so far to trace the source of this unusual constituent and had ascertained that no detrimental effect resulting from its presence had been observed.

lii PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

FRUIT AND VEGETABLE COMMITTEE.—Mr. E. A. BUNYARD, F.L.S., in the Chair, and eleven other members present.

Exhibits.

Messrs. Allgrove, Middle Green, Langley, Slough : collection of Apples.
Mr. E. A. Bunyard, Allington, Maidstone : Apple 'Wanstall Pippin.'
The Director, John Innes Horticultural Institute, Mostyn Road, Merton Park, London, S.W.19 : seedling Apples.
Mr. W. H. Divers, Westdean, Hook, nr. Surbiton : Apple 'Court of Wick.'
R.H.S. Commercial Fruit Trials, Wisley : Apple 'Baldwin.'

FLORAL COMMITTEE A.—Mr. J. M. BRIDGEFORD in the Chair, and fourteen other members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.

Silver Flora Medal.

To Ashington Nurseries, Ashington, Sussex, for Carnations.

To Messrs. Blackmore & Langdon, Bath, for Cyclamens.

Silver Banksian Medal.

To Messrs. Carters Tested Seeds, Raynes Park, for *Primula malacoides*.

To Messrs. Dobbie, Edinburgh, for Daffodils, Crocuses, Hyacinths, etc.

To Messrs. Engemann, Saffron Walden, for Carnations, Euphorbias, Antirrhinums, etc.

Flora Medal.

To Messrs. Bath, Wisbech, for Daffodils, Tulips, Hyacinths, and Crocuses.

To Messrs. Napier, Taunton, for Carnations.

Banksian Medal.

To Messrs. Low, Enfield, for Carnations.

Other Exhibits.

Messrs. Blackmore & Langdon, Bath : Polyanthus and Blue Primroses.

J. Howlett, Esq., Lymington : *Hippeastrum* 'J. Howlett.'

FLORAL COMMITTEE B.—Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and twenty-one other members present.

Awards Recommended :—

Silver Flora Medal.

To Messrs. Cheal, Crawley, for flowering shrubs.

To Messrs. Russell, Windlesham, for flowering shrubs.

Silver Banksian Medal.

To Messrs. Hillier, Winchester, for flowering shrubs.

Flora Medal.

To Messrs. Barr, Taplow, for Narcissi and other bulbous plants.

To Brookside Nurseries, Oxford, for Saxifrages.

To Messrs. Gill, Penryn, for Rhododendrons and Anemones.

To Hocker Edge Gardens, Cranbrook, for bulbous plants.

To Mr. E. Ladhams, Elstead, for a rock garden.

To Messrs. Prichard, Christchurch, for rock garden plants.

To Messrs. Reuthe, Keston, for flowering shrubs.

To Messrs. Stewart, Ferndown, for rock garden plants and shrubs.

To Messrs. Waterer, Twyford, for rock garden plants.

Banksian Medal.

To Alpine Nurseries, West Moors, for rock garden plants.

To Messrs. Bedford & Page, Cambridge, for rock garden plants.

To Mr. J. Klinkert, Richmond, for clipped Box trees.

To Messrs. Stuart Low, Enfield, for flowering shrubs.

To Messrs. Maxwell & Beale, Broadstone, for rock garden plants.

To the Rev. Canon Meyer, Little Gaddesden, for bulbous Irises.

To Messrs. Neale, Worthing, for succulents.

First Class Certificate.

To *Galanthus plicatus* Warham variety as a hardy flowering plant (votes 9 for, 4 against), from Lady Beatrix Stanley, Market Harborough. See p. 174.

Award of Merit.

To *Erica canaliculata* Boscauwen's variety as a flowering shrub for the cool greenhouse (votes unanimous), from L. de Rothschild, Esq., Exbury, Southampton. See p. 174.

To *Scilla Tubergeniana* as a hardy flowering plant (votes unanimous), from Messrs. C. G. van Tubergen, Haarlem, Holland. See p. 175.

Preliminary Commendation.

To *Gaultheria* sp. K.W. 8725 as a hardy ornamental fruiting shrub (votes 15 for), from the Marchioness of Londonderry, Newtownards.

Cultural Commendation.

To Mr. W. Wells, jun., Merstham, for a group of *Primula scapigera*.

Other Exhibits.

Messrs. Burkwood & Skipwith, Kingston : evergreen shrubs.

Messrs. Cheal, Crawley : rock garden plants.

Mr. A. Corderoy, Eltham : rock garden plants.

Miss Hopkins, Coulsdon : rock garden plants.

The Director, Royal Botanic Garden, Kew : *Prunus kansuensis*.

Mr. L. Lawrence, Taplow : succulents.

The Marchioness of Londonderry, Newtownards : *Colonema album*.

Messrs. Stuart Low, Enfield : *Camellia* 'Bush Hill Beauty.'

Waterperry School of Horticulture, Oxford : rock garden plants.

Mr. R. Colpoys Wood, West Drayton : evergreen shrubs.

ORCHID COMMITTEE.—Sir JEREMIAH COLMAN, Bart., in the Chair, and eighteen other members present.

Awards Recommended :—

Silver Banksian Medal.

To Messrs. Charlesworth, Haywards Heath, for a group.

To Messrs. Armstrong & Brown, Tunbridge Wells, for a group.

To Messrs. Sanders, St. Albans, for a group.

To Messrs. H. G. Alexander, Tetbury, for a group.

Award of Merit.

To *Cymbidium* × 'Rhodo,' Exbury var. ('Flamingo' × *Pauwelsii*) (votes 12 for, 5 against), from Lionel de Rothschild, Esq., Exbury, Southampton. See p. 173.

To *Cypripedium* × 'Lady Mona' var. 'Trident' ('Grace Darling' × 'Symphony') (votes 15 for, 2 against), from Black & Flory, Slough. See p. 174.

Other Exhibits.

Messrs. Stuart Low, Jarvis Brook : Orchid species and hybrids.

Mr. F. A. Greenfield, Horsham : *Cypripediums*.

NARCISSUS AND TULIP COMMITTEE.—Mr. E. A. BOWLES, F.L.S., F.R.E.S., V.M.H., in the Chair, and ten other members present.

Death of Mr. W. Poupart, V.M.H.—The Chairman referred to the loss which the Committee had sustained by the death of Mr. William Poupart, V.M.H., its senior member.

New members welcomed.—The Chairman welcomed two new members, Lord Rendlesham and Sir William Fitzherbert, who took their seats for the first time that day.

New Daffodils to be seen again.—Single blooms of two daffodils called 'Pendragon' and 'Ch. 502,' grown under glass, were shown by Mrs. R. S. Copley, Chircombe, Bideford, Devon. The Committee desired to see these varieties again when blooms from the open are available.

JOINT ROCK GARDEN PLANT COMMITTEE.—The Viscountess BYNG OF VIMY in the Chair, and ten other members present.

Awards Recommended :—

Award of Merit.

To *Colchicum triphyllum* as a flowering plant for the rock garden and alpine house (votes unanimous), from E. K. Balls, Esq., Knebworth. See p. 173.

To *Coptis quinquefolia* as a flowering plant for the rock garden and alpine house (votes unanimous), from Major M. F. S. Jewell, Upton-on-Severn. See p. 173.

Other Exhibits.

Mrs. G. Anley, Woking : *Crocus minimus*, Dykes' variety.

Mrs. R. Lukin, Burghfield Common : *Ranunculus calandrinoides*.

Messrs. Prichard, Christchurch : *Saxifraga* 'Iris Prichard.'

Major F. C. Stern, Goring-by-Sea : *Lithospermum rosmarinifolium*.

ANNUAL GENERAL MEETING.

FEBRUARY 23, 1937.

REPORT of PROCEEDINGS at the ONE HUNDRED AND THIRTY-THIRD ANNUAL GENERAL MEETING, held on Tuesday, February 23, 1937, in the New Hall, Greycoat Street, Westminster, London, S.W. 1.

The Lord ABERCONWAY, C.B.E., V.M.H., President, in the chair, with Members of Council and about two hundred Fellows.

The SECRETARY read the notice convening the Meeting.

The SECRETARY announced that the Minutes of the last Meeting held on February 25, 1936, had been circulated in the JOURNAL, Vol. 61, Part 4, April 1936.

The CHAIRMAN: I move that the Minutes be taken as read, and I also move their adoption. Is that agreed?

The motion was agreed and the Minutes were signed by the Chairman.

The CHAIRMAN: Ladies and Gentlemen, I have the honour again to move that the Report of the Council and the Accounts of the Society be and are hereby adopted.

The Report is, as usual, a voluminous one, and I suggest that in accordance with precedent it should be taken as read. I am also tempted to suggest—and if I made the suggestion you would, I am sure, be tempted to agree with me—that the President's Address be taken as read. Precedent is, however, against that course, as it is against other courses in life that are tempting.

It is a great satisfaction, I am sure, to all the Fellows to learn that both Their Majesties the King and Queen have graciously consented to become Patrons of the Society.

We trust that in spite of the heavy duties connected with the Coronation both Their Majesties may honour us with their presence at the Chelsea Show. King GEORGE is, as we all know, a notable gardener, and I am sure that we should all wish that throughout his reign he may find in his own personal and private garden at Royal Lodge relaxation from the onerous duties and responsibilities which are his. Nothing gives greater rest and relaxation than indulgence in the pleasure of a garden of one's own making.

I was very glad to see in the Press yesterday that little Princess ELIZABETH, following the family tradition, was starting to plant a little garden of her own at Royal Lodge. It is a very fine tradition, if one may venture to say so, in so august a family, and it is pleasing to think that the youngest generation thereof has inherited it.

Our Society continues to grow. I have requested the Secretary to give me the exact number of Fellows at this date, and I find that it is 34,014. Not only are those numbers, as you are aware, a record in themselves, but the increase for the year is also a record. These increasing numbers will enable us not only to render service to a greater number of Fellows, but to render more service to each individual Fellow, because as our numbers increase so our surplus resources are increased and our activities can be extended.

I usually deal at these meetings with our three major activities, and I propose to say a few brief words this afternoon about our Shows, about Wisley, and about our publications.

For our Shows we depend very largely on our good friends the nurserymen, and they in turn, I think, are substantially benefited by our Shows. It is what our botanical friends call a "symbiotic association"—we both benefit from the presence of the other. I am very glad to think that times are better for those who exhibit at our Shows. The nursery trade has left that nightmare of depression and has entered upon a day in which its members are grossly overworked. We admire their patience during those twin misfortunes, and we appreciate also the enterprise that they show in introducing or propagating new and rare plants, in improving the strains of florist's flowers, and in their production of new hybrids, which come before our Committees and are displayed at our Shows. I should mention that at this present Fortnightly Show—which is, I think, a very beautiful one—there have been applications for a greater area of space than has ever been recorded at any previous Fortnightly Show.

At Chelsea we shall feature—if you will forgive a word from Hollywood—Empire exhibits. We are going to have a large additional marquee on the space that has been in previous years occupied by scattered tents. The new marquee will be as large as the big marquee, and a substantial section at one end of it will be devoted to exhibits of plants and flowers which grow within the Empire overseas. I am glad to say that the authorities concerned in our self-governing Dominions and the Colonies have been most ready to help us in gathering together this exhibit. We have been promised, among other things, a large display of succulents, which are so characteristic of many parts of South Africa, and I understand that Australia is going to send us bouquets of flowers frozen into blocks of ice. I am afraid that if the weather is very hot we shall not be able to feature that exhibit on the fourth day.

Colonel DURHAM tells me that at a recent Chelsea Show, a man with a strong American accent came up to him in the Council tent and said: "Say! You've got us beat! Good-bye." But since that time the United States have made great advances in the time and attention that is devoted to gardening and in their Shows, and I propose to go over there this spring: in fact, I leave to-morrow to see the great Spring Shows in New York, Boston and Philadelphia, and I will see then whether that laconic statement is still true and if

there are features—and I expect that there will be some—in which their Shows beat ours. I will, of course, make a record of such features and will impress them upon those responsible for our arrangements at Chelsea.

We are holding this year, I am glad to say, an Autumn Show at Olympia, and I think that it will be possible to make this an annual event, because there are big new halls being erected in London which will ease the present overcrowding and, I think, enable us to obtain a suitable position every year instead of only every alternate year. I lay great stress on the Autumn Show, because I think it is a Show in which professional gardeners take a special interest, and which they are able to make a special opportunity of attending.

We have also arranged a programme of Conferences in the next few years. In 1938 we propose to have a Conference on flowering trees and shrubs, in 1939 on Rhododendrons, in 1940 on herbaceous plants, and we have issued an invitation to the International Horticultural Conference to meet here in 1941, and have offered it the hospitality of our halls. These Conferences, I think, not only provide a series of most interesting papers, but we publish, as you know, the proceedings in full, and that makes almost a work of reference on each subject.

At Wisley the main feature of the year has been the purchase of Battlestone Hill. As you turn into Wisley from the Portsmouth Road there is an elevation on the left crowned with fine tall Scots Pines. We have bought this piece of land on condition that we do not use it for building purposes. That we have no desire to do. We shall have to fence it, which is regrettable, but we propose to plant behind the fence *Rhododendron ponticum* to grow through the fence so as in a year or two to help to conceal it. We propose to plant the area, which is a good deal above the low-lying frost-ridden areas of the Wisley Wood, with Azaleas and choice Rhododendrons. We have also entered into an agreement to purchase from Lady LOVELACE the field and wood adjoining Battlestone Hill and lying between the Wisley Gardens and the Portsmouth Road. Lady LOVELACE has been good enough to sell this land to us at a most reasonable price on condition that we do not build on that land anything but buildings in connexion with the gardens. Again, we should never want to do that, as both these pieces of land are important to the amenities of Wisley. We propose in this case to plant a hedge of *Rosa Moyesii* along the Portsmouth Road, because I think the existing boundary hedge will have to be done away with for road-widening purposes. We propose to plant the agricultural part of the ground where the soil is sufficiently good with a collection of Japanese Cherry trees, so that we may have a cherry time at Wisley, and underneath the Cherry trees perhaps we may plant Daffodils. On the ridge where the soil is poor and sandy we propose to plant *Cistus* and *Cytisus* and other drought-resisting shrubs. We do not propose to make a garden of these two pieces of land, but rather a "planting," so that there will

be no undue increase of labour involved once the planting is completed.

We must bear in mind, I think, with regard to Wisley, that the object of Wisley is not merely to be a garden where one can walk in a care-free way in the sunshine or the shade : the Wisley Garden is meant definitely to help gardeners to improve their own gardens. It is an arena for a struggle with pencil and notebook. To that end we have our trials ; to that end we have our standard collections of florist's flowers, Irises and so on, from which we are constantly weeding out the unworthy sorts and to which we are adding always the best and newest sorts. For that reason we have the collection of plants which have received the Award of Garden Merit—a collection which I think is well worth visiting, because those are the plants that are most worth growing in a garden, whether the garden be large or small. With the same object we have planted a collection of the hundred best Roses—although that is rather an inaccurate term, because, of course, many of the hundred best Roses for one garden might not be suitable for another : Roses, as you know, are very eclectic in their preferences. For that reason again we have started the cool houses, the Alpine house where we display some of the more difficult Alpines which keen Alpine gardeners would like to try to grow in the open, and the shrub house, and the rock garden house, where we grow shrubs and smaller plants which would do out of doors in the milder parts of the country. It is for this same purpose, namely, to help gardeners, that we are planting our new Cherries and Rhododendrons.

To this purpose also our research work is dedicated. Of course our research work at Wisley is not so familiar to Fellows, and not so romantic as the garden : it deals with the grub and the fungus and chemicals and manures ; but at the same time the number of extra fruits and better flowers that have been produced through the work of our research staff is legion. That I think must take a very important place in the work that Wisley is doing for gardeners.

In those circumstances the Council offer to you no apologies for spending on Wisley each year the substantial sum they do out of the Society's revenue.

Then we have our publications. Our JOURNAL, in its monthly parts, owes much to Mr. CHITTENDEN, the Editor, and to our kind friends who contribute articles to it. Formerly, as you know, our JOURNAL was only sent to those of our members who made special application for it. Now it goes to all our Fellows. It arrives regularly on your breakfast table like the porridge does in the nursery, and you have to have it whether you like it or not. All I can hope is that you do consider it good sound horticultural porridge, not too difficult to digest, not too cloying to the appetite, and that, if you like it, in return you will help us by making suggestions for its improvement, and particularly if you grow interesting or rare plants will contribute to it notes on those plants, for such notes will be most helpful to us.

We have this year two specialities on our horticultural menu. One is the Index to the JOURNAL. Many of you, especially the older Fellows of the Society, have long rows of back numbers of the JOURNAL on your bookshelves, and, unless you have the leisure to look through one after another, it is very difficult to find any reference to a subject which may have special interest for you. We are now, therefore, preparing—and it will be published in the course of this year—an Index to the whole of the JOURNAL from the beginning, so that if you are interested in a special subject you can refer to any volume which is in your possession, in which there is a notice of that subject, or, if it is not in your possession, you can see it of course in our Library. That Index will have the additional advantage in that we shall, naturally, make special mention in it of all the plants which have received awards from the Society, so that if an intending exhibitor desires to know whether a certain plant has already received an award or not, he has only to look it up in the Index to the JOURNAL.

There is also being published by the British Colour Council, and under the special supervision and at the instance of Mr. R. F. WILSON, a member of that Council, in co-operation with the Society, a colour chart—you will see samples of it exhibited to-day in the hall downstairs. You will see that not only is a very wide range of colours given, but they are correlated with the colours of different flowers as far as that is possible. Mr. BOWLES, who has a great knowledge of flower colours, has been good enough to co-operate in this work with other prominent horticulturists. The colour chart is intended to be for the use of horticulturists and especially for the trade, who will, by its aid, be able we hope to describe the colours of the flowers they offer in words which can be at once correlated with the chart in the hands of their customers and will be exact and without doubt. We hope that as many Fellows of the Society as possible will subscribe to this colour chart and will send in their names before the date mentioned on the circular, as after that date it will be more difficult to supply them with copies. A full circular on the matter will, I think, go to you with the March issue of the JOURNAL.

So much for our activities. There comes always in the President's remarks a sad note when he has to refer to the retiring members of the Council. This year we lose Sir JOHN DU CANE, a man who has done very many things in an active life and has always made a success of everything he attempts. We lose also Mr. OLDHAM, a man who grows and propagates plants by the million, who has given us of his great experience of the horticultural trade and of his knowledge of affairs. Mr. MUSGRAVE also retires this year; but we have a provision in our Charter whereby one retiring member of Council in any year may be re-elected for the succeeding year. Usually, you know, there must be a gap of one year. The Council do not desire to use that provision unless it is very desirable to do so, but we honestly find that we cannot get along without Mr. MUSGRAVE's help. He does so much

for us in many ways, and especially at Wisley. We have only used that power once before, and by a most curious coincidence on the previous occasion it was also used to secure Mr. MUSGRAVE's services without a gap.

We shall welcome back on the Council two old friends : Mr. HAY, a man who has always new ideas as well as new plants at his disposal, and Mr. LEAK, a great stand-by in horticultural matters, a man of profound knowledge and of judgment.

Our staff, by a happy chance, do not retire periodically like members of the Council. We are most satisfied with them, and the fact that they stay with us, we believe, shows that they are satisfied with us. We are certainly very fortunate in having Colonel DURHAM, Mr. CHITTENDEN, Mr. HARROW, and Mr. SIMMONDS, to mention the leading members, who give us not only the good work we expect of them but a great deal more. They work very strenuously we know, and we believe that they work very harmoniously—at any rate no whisper of any differences of opinion penetrates to the Council chamber.

We have adopted the policy in recent years of adding to our staff younger men to train on in the future for executive positions. We think it very important that we should always have on our staff a leaven of young men coming on, and with your approval we propose to pursue this policy.

In conclusion, I would like to say this : that in all our work we have a vast amount of voluntary help. We have work and help from members of Council, from members of our Committees, from judges, from those who write for us, from those who lecture to us, and from those who bring plants up for exhibition. The Society, as you know, and as our Treasurer will tell you, is rich in its great revenues, but I venture to think it is richer still in the services it commands, services many of them, very many of them, of a quality beyond price.

I now have pleasure in calling upon Mr. TROTTER, our Treasurer, to second the motion, and after that I shall be pleased to answer any questions that any Fellow of the Society would like to put to me.

Mr. R. D. TROTTER : Mr. President, Ladies and Gentlemen,—In seconding the Report which you have just heard moved, will you allow me to give you a few explanations of some of the figures contained in the recent issue of the JOURNAL which you have before you.

By a curious coincidence the actual running expenses at Vincent Square are £100 additional and at Wisley £20 additional. I do not think we have ever been quite so close as that in the normal running expenses, but I am afraid there are several items of increase which alter the figures beyond that extent.

If you turn to the Balance Sheet, those of you who wish to follow the explanations, you will see the first item on the Expenditure side of the Revenue and Expenditure Account is " Establishment Expenses." This figure shows an increase of £1,001, which is accounted

for as follows: Rents, Rates and Taxes £103, Salaries and Wages £781, and miscellaneous items £117. The net increase in Salaries and Wages is actually only £323; the difference represents the amount which is normally allocated to the Autumn Show Account which was not actually held in 1936, and the amount therefore goes back into these Establishment Expenses.

Then "JOURNAL and Other Publications"—The net cost of the JOURNAL and other publications exceeds last year's figure by £585. The printing and postage of the JOURNAL with an increased circulation, as the President has told you, plus the drop in Revenue from advertisements in the JOURNAL, accounts for £503.

Meetings have cost a little less, owing to there being no Autumn Show, but the Chelsea expenses are up, owing to increased rent, and we had to pay the cost of clearing the Show sites which the Council have undertaken for some of the exhibitors.

Cups and Medals are down by £221, as the cost of the Jubilee Medals was included last year.

Special Expenditure is also down by £956. Last year there was an appropriation of £500 towards the cost of the JOURNAL Index, and we also met the cost of secondary lighting in the New Hall, about £230. The only other item in the Vincent Square expenditure which shows a substantial difference is the deficit in the Restaurant Account. By judicious and economical administration on the part of the Secretary this has been reduced from £939 to £603, but I am afraid this figure must vary from year to year.

Turning now to the Receipts side, you will see our Annual Subscriptions have increased by £2,262, which is accounted for by the increase in membership—1,799—of which you have already heard this afternoon.

The Hall Lettings were not so good, being less by £2,574. I explained last year that in 1935 the receipts were very abnormal, as there were several good lettings which were non-recurring and the present figure is about a good average. The result of the Revenue Account gives us a surplus of £8,194 *zs. od.* as against £9,409 *18s. 8d.* in 1935, about £1,200 less.

I now come to the Vincent Square Balance Sheet—first of all the Liabilities side. It has been decided to re-name the Capital Funds Account, and in future it will be known as the "Accumulated Funds Account," as it is felt that this title will more aptly describe the contents of this fund. The fund actually represents the accumulation of revenue surplus during the past years, and it has been chiefly expended on the buildings and freehold property.

The fund itself has been raised to a round figure of £250,000 by transfer from the Revenue Account, and the balance of the Revenue Account is transferred to a newly created General Reserve, in which we include other items as you will see; the item "Reserve against Depreciation of Investments" has also been credited to this General Reserve Fund.

The Sundry Creditors Account includes such items as :

	£
Gas and Electric Light	485
JOURNAL Printing and Postage (one issue)	1,100
Income Tax	764
Hall Lettings paid in advance	456
JOURNAL Index	500
Wisley Special Expenditure	976

On the Assets side—we have transferred from the Liabilities side of the Balance Sheet the Old and New Halls' Sinking Fund, and this is now being used to write down the cost of the Old and New Halls and their equipment ; this asset will gradually be replaced by the Sinking Fund investments. I hope that is clear to Fellows, because it has altered the form of the Balance Sheet.

Freehold property has been added to by the purchase of land at Wisley, and the total £13,104 now includes 146 acres (with buildings), £5,790, and 12 cottages, £6,967.

General Investments has received a further £50,000, and other sums transferred as a result of profits derived from changes in investments. The Depreciation of Investments Fund investments have also been transferred to this fund.

The item of " Sundry Debtors " includes :

	£
Rates paid in advance	506
Army and Navy Stores Restaurant Account	710
Advertising Account	709
Income Tax recoverable	400
Accrued Dividends	699
Autumn Show Deposit	100

The Cash Balance stands at £4,218 14s. 1d. It was expected that before the end of the year we should be called upon to meet the cost of the further purchase of land at Wisley and the cost of building a cottage on the Fruit Trials Ground, but the contract in the first instance was not complete, and in the second the building had only just been commenced ; we therefore have the cash in hand to meet these contingencies.

I now come to the Wisley Balance Sheet. The total normal expenditure at Wisley exceeds that of 1935 by £215, but the receipts owing to the better fruit year show an increase in proceeds, with the result that the net expenditure at Wisley was only £20 more than that in 1935.

Then we have the special expenditure at Wisley which totals £2,738 12s. 5d., and includes purchases of land and the freehold cottage which have already been mentioned, and other items, including the extensions to the bothy, in order to provide more accommodation for our employees.

lxii PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

The net result, £15,009, is the balance of expenditure at Wisley during the year, and compares with the figure of £13,896 in 1935.

With regard to the Wisley Balance Sheet, apart from some small additions to the Wisley assets, there is little change. As in the case of the Vincent Square Balance Sheet, the title of the Capital Funds Account has been changed to that of "Accumulated Funds Account."

I now come to the Trust Funds. One Trust Fund has been added this year, that is the P. D. Williams Fund. This Fund was raised in 1936 by donations to commemorate the late P. D. Williams, and medals will be awarded from this fund for Daffodils and Rhododendrons, the flowers in which he was specially interested.

There have been changes made in some of the Trust Funds Investments during the year, and in such cases the profits obtained have been credited to the Funds. The following pages which you have in the Accounts give a full list of the Society's investments as appropriated to each Fund.

I have much pleasure in seconding the Report.

The CHAIRMAN, after answering two or three questions, then put the following resolution :

THAT the Report and Accounts of the Council be and are hereby adopted.

(Motion put and carried unanimously.)

Mr. E. A. BOWLES (Vice-Chairman) : It is now my pleasing duty to declare to you the re-election of Lord Aberconway as President of this Society for the year 1937. I am enabled to do this because there was no other nomination under Bye-law 57, and I am sure you will not be surprised to hear that there was no other nomination. All those who know the geniality and ability with which Lord Aberconway has conducted the affairs of the Society during the last year would feel themselves foolish indeed if they thought of exchanging him for another President.

The CHAIRMAN : I can only say I greatly appreciate the honour done me by Fellows of the Society in re-electing me their President. If they desire to re-elect me I will give them of my best, and I hope I will never give you occasion to say of me that I outstayed my welcome.

I declare the election of the following as Vice-Presidents, there being no other nominations under Bye-laws 57 and 61 :

The Duke of Bedford.

The Duke of Portland.

The Viscount Ullswater.

The Rt. Hon. Sir Herbert Maxwell, Bt.

Sir Daniel Hall.

Lt.-Col. Sir David Prain.

Mr. E. A. Bowles.
Mr. C. T. Musgrave.
Mr. C. G. A. Nix.
Mr. J. C. Williams.

I also declare the election of the following Members of Council :

Mr. T. Hay.
Mr. G. W. Leak.
Mr. C. T. Musgrave.

I also declare the election of Mr. R. D. Trotter as Treasurer, and Mr. J. S. Feather of Messrs. Harper, Feather and Paterson, as Auditor. May I say in this connexion how much the Society is indebted to Mr. Feather for the care that he gives to our accounts and for the fertile suggestions he makes.

I will now make the presentations of the Medals and other Awards.

PRESENTATIONS.

Victoria Medals of Honour.—To British Horticulturists resident in the United Kingdom and deserving special honour at the hands of the Society.

The CHAIRMAN : Colonel Stephenson Clarke, it gives me very great pleasure to present you with the Victoria Medal of Honour. You were one of the band of those who commenced shrub gardening in the modern fashion. Among them were Lord Wakehurst, Mr. P. D. Williams, Mr. Edmund Loder, Mr. Vicary Gibbs and Mr. J. C. Williams.

I am glad Colonel Stephenson Clarke is still with us. He has, in addition to his great interest in shrubs, also taken a very wide interest in other plants, and his garden not only contains the best of Rhododendrons and the best of shrubs, but the best of greenhouse plants and of bulbs. There is no one who more thoroughly deserves this premier award of the Society than our old friend, Colonel Stephenson Clarke.

The SECRETARY : Mr. J. Comber.

The CHAIRMAN : Mr. Comber has also had great experience with shrubs and other plants, but I think among his outstanding successes, out of many horticultural successes, was the way he raised the collections of seeds sent from the Andes by his son, Mr. H. F. Comber. In raising those seeds no doubt his motives were mixed ones, but notwithstanding that, they were splendidly raised, and he brought into cultivation many plants which other raisers of seeds had failed to germinate. I congratulate you, Mr. Comber, and give you the Victoria Medal of Honour.

The SECRETARY : Mr. F. A. Secrett.

The CHAIRMAN: Mr. Secrett, you are one of the leaders of the commercial cultivation of flowers and vegetables in this country. You were, I believe, the pioneer of the modern methods of irrigation and modern methods of manuring.

Mr. Secrett will grow anything for which there is a demand, from a daffodil to a parsnip. What I think is most striking is that he is always willing to put the results of his research and experience at the service of others, even although they be his trade rivals. As a result of what Mr. Secrett has done, we have to a much greater extent than in the past been able to utilize our own vegetables and flowers instead of importing them from abroad.

The Associateships of Honour were then conferred on the following:

Mr. Wm. Bailey, Head Gardener at Crooksbury House, Farnham.

Mr. T. W. Bolas, Head Gardener at Mount Stewart, Newtownards, Co. Down.

Mr. F. G. Preston, Curator of the University Botanic Garden, Cambridge.

Mr. A. B. Wadds, Head Gardener at Englefield House, Reading.

The Lawrence Medal.—To Messrs. John Waterer, Sons & Crisp, Ltd., for their exhibit of Japanese Cherries staged on March 24, 1936.

The Holford Medal.—To Mr. J. Pierpont Morgan, for his exhibit of Begonias, Gesneria Hybrids and foliage plants staged on November 10, 1936.

Veitch Memorial Medal in Gold.—To Sir Arthur Hill, for his services to Horticulture.

Veitch Memorial Medal in Silver and £25.—To Mr. R. L. Harrow, for his services to Horticulture.

The Sander Medal.—To the Director of the Royal Botanic Gardens, Kew, for *Beloperone guttata* shown on September 29, 1936.

The George Moore Medal.—To Mr. M. L. Wells, for *Cypripedium* 'Kay-Kay' var. 'Sunny' shown on November 24, 1936.

Williams Memorial Medal.—To Messrs. Charlesworth, Ltd., for their exhibit of *Odontiodas* staged on March 10, 1936.

To Mr. J. L. Richardson, for his exhibit of Daffodils staged on April 16, 1936.

The Reginald Cory Cup.—To Mr. A. Harley, for his *Gentiana* 'Devonhall' shown on September 1, 1936.

The Loder Rhododendron Cup.—To Mr. E. J. P. Magor, in recognition of his introduction of many interesting Rhododendron Hybrids and other work in connexion with Rhododendrons.

That, Ladies and Gentlemen, concludes our List of Presentations.

Mr. NOTCUTT : There is one more thing to do before we separate. I am sure it will be the wish of all to accord a very hearty Vote of Thanks to our President, Lord Aberconway, for presiding over this meeting this afternoon and for his delightful speech. He gave us three very pleasant pieces of news : first, the pleasing increase in membership ; second, the improvements and extensions at Wisley, and the revival of the Autumn Show ; and thirdly, we shall all very much welcome the Index to the JOURNAL. When you have long rows of these volumes, life is too short to find out the particular article you need ; I am sure that will be a great benefit.

In Lord Aberconway we have a most wonderful President, a man who has expert horticultural knowledge, together with a wonderful knowledge of business, both very important attributes for a man at the head of such a great Society as our own. I have very great pleasure in moving a very hearty Vote of Thanks to our President.

Mr. CRANE : I have very much pleasure in seconding the Motion proposed by Mr. Notcutt. We are very greatly indebted to Lord Aberconway for his conduct in the Chair here to-day. This Annual Meeting is an event which we all look forward to, as each year Lord Aberconway has so much to tell us which is of interest to horticulturists. He has again given us a fund of information which will encourage us in our persistent efforts to put forward the interests of horticulture.

I am sure we all view with much interest the fact that he is now going to the United States of America ; we certainly hope he will have a very happy and prosperous time and come back with information which will be helpful to the Royal Horticultural Society.

The CHAIRMAN : I must thank Mr. Notcutt and Mr. Crane for the too kind words they have used about me, and you, Fellows of the Society, for the way you have received the Motion. I can only say it is a very great pleasure to preside over so interesting and sympathetic an audience.

I thank you all for your attendance, and I declare this meeting closed.

(The proceedings then terminated.)

GENERAL MEETINGS.

FEBRUARY 23, 1937.

SCIENTIFIC COMMITTEE.—Mr. E. A. BOWLES, M.A., F.L.S., F.R.E.S., V.M.H., in the Chair, and four other members present.

Asparagus fly in Heris.—Dr. Fryer showed specimens of *Asparagus* stems containing pupæ of the *Asparagus fly* (*Platyparsa poeciloptera*) from a garden near Hertford. This fly was unknown in this country until the last year or two, but had now been found in several private gardens between Barnet and St. Albans and near Hertford. The origin of the invasion is unknown, but it appears to be extending its distribution northwards on the Continent. The fly lays its eggs in May to July and the larvæ feed in the *Asparagus* stems, pupating there or in the earth around them. The affected stems become

lxvi PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

prematurely yellow. No effective measure of eradication has been discovered, though the use of carbon bisulphide emulsion in early spring destroys many of the pupæ. The insertion of sticks smeared with tanglefoot in the bed at the time of cutting is said on the Continent to result in many flies being trapped.

Seed beetle.—Mr. G. Fox Wilson showed seeds of *Gymnocladus sinensis* received at Wisley from the Luchan Botanic Garden, China, riddled by the larvæ of *Bruchus dorsalis*, the perfect beetles of which were also shown.

Fruit of Strelitzia regina.—Mr. Bowles showed a small fruit of *Strelitzia regina* obtained by artificial pollination in his garden. The three-valved fruit normally contains many black seeds (but two only in the present instance), each with a fimbriate orange aril.

FRUIT AND VEGETABLE COMMITTEE.—Mr. W. H. DIVERS in the Chair, and eighteen other members present.

Award Recommended :—

Silver Hogg Medal.

To Messrs. Allgrove, Middle Green, Langley, Slough, for collection of Apples.

Other Exhibits.

Messrs. Allgrove, Middle Green, Langley, Slough : seedling Apple.

Mr. E. Betts, Galagate Lodge, Cowell Road, Haywards Heath : seedling Apple.

Lt.-Col. R. C. Batt, Gresham Hall, Norwich : Apple 'Gresham Redcoat.'

Messrs. Rivers, Sawbridgeworth, Herts : Citrus fruit trees in pots, and collection of Apples.

R.H.S. Commercial Fruit Trials, Wisley : Apple 'Heusgen's Golden Reinette.'

Mr. F. Streeter, Petworth Park Gardens, Petworth : Apples 'Annie Elizabeth,' and 'Sussex Pippin.'

Mr. A. Taylor, Church Road, Haywards Heath : Apple 'Ronald.'

FLORAL COMMITTEE A.—Mr. J. M. BRIDGEFORD in the Chair, and seventeen other members present.

Awards Recommended :—

Silver-Gilt Banksian Medal.

To Cornish Growers, Truro, for flowers and Broccoli packed for market.

Silver Flora Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.

To Messrs. Carters Tested Seeds, Raynes Park, for Tulips and *Primula malacoides*.

To Messrs. Dobbie, Edinburgh, for Hyacinths and Daffodils.

Silver Banksian Medal.

To Ashington Nurseries, Ashington, Sussex, for Carnations.

To Messrs. Blackmore & Langdon, Bath, for Cyclamens and Blue Primroses.

To Mr. G. H. Dalrymple, Bartley, for Freesias.

To Messrs. C. Engelmann, Saffron Walden, for Carnations, Euphorbias, Antirrhinums, etc.

To Messrs. Napier, Taunton, for Carnations.

To Messrs. Sutton, Reading, for *Primula malacoides*.

To Messrs. Wakeley, London, for Crocuses.

Banksian Medal.

To Capt. G. S. Brocklebank (gr. Mr. J. T. Boulton), Flimwell, for *Primula malacoides*.

To Messrs. Low, Enfield, for Carnations.

To Messrs. Pearson, Lowdham, for Daffodils, Hyacinths, Tulips, etc.

To Messrs. Toogood, Southampton, for Cinerarias.

The following awards were recommended after trial at Wisley :—

First-class Certificate.

To Freesia 'George Washington,' from Messrs. G. C. van Meeuwen, Heemstede, Holland.

Award of Merit.

To Freesia 'Enchantress,' from Messrs. G. C. van Meeuwen, Heemstede, Holland.

To Freesia 'Yellow Surprise,' from Messrs. G. C. van Meeuwen, Heemstede, Holland.

Highly Commended.

Freesia 'Gertrude Carlée,' from Messrs. G. C. van Meeuwen, Heemstede, Holland.

Other Exhibits.

Messrs. Clark, Dover : coloured Primroses.

Mrs. A. G. Fuller, Cowden : Cinerarias, Cyclamens and Primulas.

Messrs. Prins, Wisbech : Hyacinths, Daffodils, Tulips, etc.

Swanley Horticultural College, Swanley : greenhouse plants.

FLORAL COMMITTEE B.—Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and twenty-six other members present.

Awards Recommended :—*Silver-gilt Banksian Medal.*

To Messrs. Clarence Elliott, Stevenage, for Saxifrages and other rock garden plants.

Silver Flora Medal.

To Messrs. Hillier, Winchester, for flowering trees and shrubs.

To Messrs. Russell, Windlesham, for flowering trees and shrubs.

To Messrs. Waterer, Bagshot, for flowering trees and shrubs.

Silver Banksian Medal.

To Messrs. Cheal, Crawley, for flowering trees and shrubs.

Flora Medal.

To Alpine Nurseries, West Moors, for rock garden plants.

To Messrs. Barr, Taplow, for bulbous plants.

To Messrs. Bedford & Page, Cambridge, for rock garden plants.

To Dartington Hall Gardens, Totnes, for rock garden plants and shrubs.

To Messrs. Gill, Penryn, for Rhododendrons, Camellias and Anemones.

To Hocker Edge Gardens, Cranbrook, for bulbous plants.

To Messrs. Hollamby, Groombridge, for flowering trees and shrubs.

To Mr. E. Ladhams, Elstead, for rock garden plants.

To Messrs. Stuart Low, Enfield, for Camellias and other shrubs.

To Messrs. Prichard, Christchurch, for rock garden plants.

To Messrs. Reuthe, Keston, for flowering shrubs.

To Messrs. Stewart, Ferndown, for flowering shrubs and bulbous plants.

To Walton Park Nurseries, Walton, for flowering trees and shrubs.

To Messrs. Waterer, Twyford, for rock garden plants.

To Mr. G. E. Welch, Cambridge, for rock garden plants.

To Messrs. Wood, Taplow, for flowering shrubs.

Banksian Medal.

To Brookside Nurseries, Oxford, for rock garden plants.

To Messrs. Ingwersen, East Grinstead, for rock garden plants.

To Mr. J. Klinkert, Richmond, for clipped Box trees.

To Mr. L. Lawrence, Taplow, for succulents.

To Marsden Nurseries, Ashstead, for rock garden plants.

To Messrs. Maxwell & Beale, Broadstone, for rock garden plants.

To Messrs. Neale, Worthing, for succulents.

To Mr. W. Wells, junr., Merstham, for rock garden plants.

To Mr. G. G. Whitelegg, Chislehurst, for shrubs and rock garden plants.

Award of Merit.

To *Abeliophyllum distichum* as a hardy flowering shrub (votes 18 for), from Lord Aberconway, Bodnant. See p. 173.

To *Erica quadrangularis* as a flowering shrub for the cool greenhouse (votes 21 for, 1 against), from the Exors. of the late Viscountess St. Cyres, Walhampton, Lymington. See p. 174.

To *Gladiolus viperatus* as a flowering plant for the cool greenhouse (votes 17 for, 4 against), from T. T. Barnard, Esq., Wareham. See p. 174.

To *Jasminum dispernum* as a flowering shrub for the cool greenhouse (votes 21 for), from A. E. Osmaston, Esq., Billingshurst. See p. 174.

To *Rhododendron* 'Daphne' var. 'Eithne' as a hardy flowering shrub (votes 12 for, 1 against) from E. J. P. Magor, Esq., St. Tudy, Cornwall. See p. 175.

To *Rhododendron moupinense* Pink form as a hardy flowering shrub (votes 13 for), from Lord Aberconway, Bodnant. See p. 175.

Selected for trial at Wisley.

Linaria maroccana E.K.B. 2784. Sent by Lt.-Col. C. H. Grey, D.S.O., Hocker Edge, Cranbrook.

Other Exhibits.

Mrs. Akroyd, Limpfield : *Crinum Laurentii*.

Mrs. G. Anley, Woking : *Crocus biflorus Alexandri*, *C. vernus* × *Tomasinianus*.

T. T. Barnard, Esq., Wareham : *Gladiolus trichonemifolius*.

lxviii PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

D. R. Carrick Buchanan, Esq., Stranraer : *Rhododendron crassum* var. *chrysodoron*.

Messrs. Burkwood & Skipwith, Kingston : shrubs.

The Director, University Botanic Garden, Cambridge : *Asara integrifolia*.

Chez Nous Nurseries, Newick : rock garden plants.

Messrs. Clark, Dover : rock garden plants.

Mr. A. Corderoy, Eltham : rock garden plants.

Messrs. Fielden & Crouch, Wrotham : rock garden plants.

Messrs. Garways, London, W. : succulents.

Miss Hopkins, Coulsdon : rock garden plants.

The Director, John Innes Hort. Inst., Merton : *Columnea Banksii*.

The Director, Royal Botanic Gardens, Kew : *Beloperone guttata*.

Letchworth Plants, Ltd., Letchworth : rock garden plants.

E. J. P. Magor, Esq., St. Tudy : *Rhododendron* 'Dione.'

Orchard Neville Nursery, Glastonbury : rock garden plants.

Owermoinge Nursery, Dorchester : rock garden plants.

Messrs. Redgrove & Patrick, Sevenoaks : shrubs and rock plants.

Messrs. Rogers, Southampton : shrubs and rock plants.

L. de Rothschild, Esq., Exbury : *Rhododendron scabrifolium*, R. 'Abbot.'

Major F. C. Stern, Goring-by-Sea : *Gladiolus revolutus*.

Exors. of the late Viscountess St. Cyres, Lymington : *Lachenalia Durnsii*, *Erica quadrangularis alba*.

Lady Sueter, Watlington : *Cyclamen persicum*.

Waterperry School of Horticulture, Oxford : rock garden plants.

White House Gardens, Abergavenny : rock garden plants.

Messrs. Wood & Son, Taplow : rock garden plants.

ORCHID COMMITTEE.—Sir JEREMIAH COLMAN, Bart., in the Chair, and twelve other members present.

Awards Recommended :—

Gold Medal.

To Messrs. Charlesworth, Haywards Heath, for a group.

First-class Certificate.

To *Vuylssteheara* × 'Rajah' var. 'Eclipse' (*Odontioda* × 'Sapphire' × *Vuylssteheara* × 'Leda') (votes 8 for, 2 against), from Messrs. Charlesworth, Haywards Heath. See p. 175.

To *Cymbidium* × 'Carisbrook' var. 'Brilliance' ('Ceres' × 'Ralph Sander') (votes 7 for, 3 against), from Messrs. McBean, Cooksbridge. See p. 173.

Award of Merit.

To *Cypripedium* × 'Cameo' ('Etta' × 'Nesta II') (votes 8 for, 3 against), from Sir William Cooke, Bart., Hampstead Norris, Berks. See p. 174.

Other Exhibits.

Messrs. H. G. Alexander, Tetbury : a group.

Messrs. Armstrong & Brown, Tunbridge Wells : a group.

Messrs. Stuart Low, Jarvisbrook : a group.

Messrs. McBean, Cooksbridge : a group.

Messrs. H. Dixon, Wandsworth Common : a group.

Col. E. Middleton Perry, Sutherlands, Wimbledon : *Cymbidium* × *Penelope*.

F. J. Hanbury, Esq., East Grinstead : *Odontioda* × 'Laura.'

(To be continued.)

EXTRACTS FROM THE PROCEEDINGS

OF THE

ROYAL HORTICULTURAL SOCIETY.

NOTICES TO FELLOWS.

CHELSEA FLOWER SHOW.

Royal Hospital Grounds.

There is every reason to believe that Chelsea Show this year, coming as it does close upon the Coronation of Their Majesties, will be exceptionally fine. Certainly every effort towards that end has been made on all sides. It is also to be expected that the number of visitors will be exceptionally great, and Fellows are urged to make full use of *all* the hours during which the show is open. There is always a tendency towards dense crowding in the mid-morning and afternoon hours, but anyone desiring to avoid the crowded hours can do so by visiting the show before eleven in the morning, during the lunch hour, or after five or half-past in the evening.

Empire Exhibit.

The Empire Exhibit, which is to be staged at the Chelsea Show to celebrate the Coronation, is gradually assembling, and since the last notice about it appeared we have been informed that a collection of live plants and a collection of plants in ice are being sent over from Australia, and that a consignment of plants is on its way from India. Further promises of assistance have also been received from various firms and owners of private gardens.

The organization of an exhibit of this sort is naturally attended by considerable difficulties, owing, largely, to the great distances which the plants have to travel and the short time available for their preparation after arrival. The greatest possible assistance is being received from the Director and Curator of the Royal Botanic Gardens at Kew, where most of the imported plants are being cared for. The Society is also greatly indebted to a number of amateurs and horticultural traders who, upon being approached, have willingly undertaken to augment the plants received from overseas. It is believed that the resulting Empire Exhibit will be an outstanding feature of the Show, and a special attraction to the visitors from the Dominions and Colonies who will be in London for the Coronation.

Arrangements for the Admission of Fellows and General Public.

On Tuesday, May 25, Fellows will be admitted between 2 and 8 P.M. on presentation of special invitation cards *together with* their Fellows' tickets, and for the convenience of those who arrive before two o'clock the Ranelagh Gardens will be open at 1 o'clock (see the enclosed leaflet).

On Wednesday, May 26, between the hours of 8 A.M. and 12 noon, and on Thursday, May 27, between the hours of 8 and 10 A.M., the Show will be open to Fellows and their friends when admission will be granted only on presentation of Fellows' passes and tickets.

The general public will be admitted on payment as follows :

	s.	d.
Wednesday, May 26, from 12 noon to 8 P.M. . . .	10	0
Thursday, May 27, from 10 A.M. to 5 P.M. . . .	5	0
" " " 5 P.M. to 8 P.M. . . .	2	6
Friday, May 28, from 9 A.M. to 5 P.M. . . .	2	6

Tickets may be obtained before the Show at the Society's Offices, Vincent Square, Westminster, S.W. 1, but during the Show they will be on sale at the entrances only.

lxx PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

Admission of Self-propelled or Invalid Chairs.

Self-propelled or invalid chairs cannot be admitted on Wednesday, May 26, but on Thursday and Friday, May 27 and 28, they will be admitted between the opening hour and 12 noon on payment of an extra 5s. for each chair, which covers one attendant.

Traffic Arrangements at Chelsea Show.

The attention of Fellows is drawn to the circular enclosed in this issue of the JOURNAL, which has been kindly supplied by the Automobile Association, giving the official traffic arrangements and parking places with regard to the Chelsea Show. In past years it has been found that a similar leaflet has been of considerable assistance to visitors to the Show.

Railway Facilities.

It would probably be worth the while of those Fellows who live in the country and who propose to visit Chelsea Show to make inquiries as to what special railway facilities there may be available at that time, for the Society has been informed by the Railway Clearing House that there are numerous cheap fare facilities in operation to London. In addition, by prior arrangement with the railway company concerned, parties of not fewer than eight adults travelling together will be issued tickets, available on the day of issue only, at the ordinary single fare for the double journey, fractions of 1d. being reckoned as 1d., third class; first-class fares, 50 per cent. over the third-class fares. Persons travelling with these day tickets from distances over 150 miles may commence the outward journey before midnight, but not earlier than 9 P.M. the previous day.

For Fellows in the North of England special night bookings are in operation between specified stations in the North of England and London, by certain services each night at the ordinary single fare for the double journey, available for return by specified night trains within 17 days of the date of issue.

For further particulars in regard to these facilities Fellows are asked to apply at their railway stations.

CALENDAR.

May 4, 12 noon to 7.30 P.M.—Fortnightly Meeting and Show of Flowers in Season in the New Hall. On this occasion there will be a competition for the Sewell Medals.—See p. lxxi.

May 4, 1 to 7.30 P.M.—Rhododendron Association's Show in the Old Hall.

At 3.30 P.M. on May 4, in the Lecture Room of the New Hall, Mr. F. C. PUDDLE will give a lecture on "Hybrid Rhododendrons."

May 5, 10 A.M. to 5 P.M.—Fortnightly Meeting and Show of Flowers in season, and Rhododendron Association's Show, continued.

May 26 to 28.—Chelsea Flower Show in the Royal Hospital Grounds, Chelsea.—See special notice, p. lxxix.

June 4, 5.—Teachers' Advanced Practical Examination at Wisley.

June 8, 12 noon to 7.30 P.M.—Fortnightly Meeting and Show of Flowers in season. There will be two competitions on this occasion, the Sewell Medal Competition for Alpines, and a competition for Shrubs.—See p. lxxi.

June 8, 1 to 7.30 P.M.—Iris Society's Show in the Old Hall.

At 3.30 P.M. on June 8, in the Lecture Room of the New Hall, the first Iris Group Meeting of the year will take place, when Major F. C. STERN will give a lecture on "Irises."—See special notice, p. lxxi.

June 9, 10 A.M. to 5 P.M.—Fortnightly Meeting and Show of Flowers in season and Iris Society's Show, continued.

At 3.30 P.M. on June 9, in the Lecture Room of the New Hall, a lecture will be given under the auspices of the Institute of Landscape Architects on "Landscape Architecture in America," and Fellows interested in that subject are invited to attend.

June 14–18.—Preliminary Practical Examinations for the National Diploma in Horticulture at Wisley.

June 22, 12 noon to 7.30 P.M.—Fortnightly Meeting and Show of Flowers in season. On this occasion the London and South of England Viola and Pansy Society will stage their Annual Show.

At 1 to 7.30 P.M.—Cactus and Succulent Society's Show in the Old Hall.

At 3.30 P.M. on June 22, in the Lecture Room of the New Hall, Mr. R. S. LYNCH will lecture on "Gardens of Easy Maintenance."

At 4.30 P.M. on June 22, in the Restaurant of the Old Hall, there will be a Lily Group Discussion on "Nomocharis."

June 23, 10 A.M. to 5 P.M.—Fortnightly Meeting and Show of Flowers in season, and Cactus and Succulent Society's Show, continued.

June 22 to 25.—Final Practical Examinations for the National Diploma in Horticulture at Wisley.

SEWELL MEDAL COMPETITION.

The Sewell Medal is awarded for exhibits of plants suitable for the rock garden or alpine house.

Two are offered for award at the Fortnightly Show on May 4, the entries for which closed on April 28.

At the Fortnightly Show on June 8 one Sewell Medal is offered for an amateur's exhibit of three pots or pans not exceeding 12 inches in diameter if circular, or 112 square inches in internal area if rectangular. Only one subject may be shown in each pot or pan, but it is not necessary that the plants should have been grown in the receptacles in which they are shown; if desired, plants may be lifted and potted for the purposes of the competition. Not fewer than two-thirds of the plants in each exhibit must be in bloom, and plants which are not in bloom should possess decorative value when shown. The scale of points for judging will be as follows: Suitability, 24 points; Rarity, 18 points; Cultivation, 24 points.

Entries must be made on special forms obtainable from the Secretary, by whom the completed form must be received not later than by the first post on Wednesday, June 2.

COMPETITIVE CLASSES FOR AMATEURS: SHRUBS.

At the Fortnightly Show on June 8 there will be two competitive classes for exhibits of Shrubs sent in by amateurs.

Class A.—8 vases of hardy shrubs, 8 varieties, not more than 2 of any one genus. First prize, 60s.; Second, 45s.; Third, 10s.

Class B.—1 vase of a hardy shrub. First prize, 20s.; Second, 15s.; Third, 10s.

Entries must be made on special forms obtainable from the Secretary, by whom the completed forms must be received not later than by the first post on Wednesday, June 2.

IRIS GROUP.

On June 8 the Iris Group is holding its first meeting of the year in the Lecture Room of the New Hall at 3.30 P.M., when Major F. C. STERN will lecture on "Irises." Fellows of the R.H.S. and members of the Iris Society are particularly invited to attend this group meeting, and the Secretary would be glad to register the names of any persons interested in this group.

AWARD OF R.H.S. CUP IN AMERICA.

The cup which was offered by the Society to the Massachusetts Horticultural Society for award at their Spring Show at Boston on March 12 to 18 was won by the Trustees of the Isabella Stewart Gardner Museum for a large group in which *Jasminum primulinum* was a principal feature. It was presented on behalf of the Society by Lord ABERCONWAY, our President, who was visiting America at that time.

HORTICULTURAL COLOUR CHART.

Fellows are reminded that the number of copies of the first volume of the Colour Chart (to be published in June), which can be obtained at the very low pre-publication price of 10s. per copy, is limited, and they are urged to send in their orders at once if they desire to obtain copies at that price.

INSPECTION OF GARDENS.

Many Fellows may not be aware of the terms under which their gardens can be inspected by the Society's Garden Inspector, and advice given thereon. They are set out below, and it will be seen that special arrangements can be made when Fellows living in the same district co-operate.

"The inspection of Gardens belonging to Fellows is conducted by a thoroughly competent Inspector from the Society, who reports and advises at the following cost, viz.: a fee of £3 3s. for one day (or £5 5s. for two consecutive days), together with all out-of-pocket expenses. No inspection may occupy more than two days, save by special arrangement. Should

two or more Fellows residing in the same district, with their Gardens within easy reach of one another, desire to have the services of the Garden Inspector, arrangements will be made for such a combined inspection and the fee and expenses divided by consent of those concerned. Fellows wishing for the services of an Inspector are requested to give at least a week's notice and choice of two or three days, and to indicate the most convenient railway station and its distance from their garden. Gardens can only be inspected at the *written* request of the owner."

WHITE FLY PARASITE.

Where the parasite of the greenhouse white fly, *Encarsia formosa*, has been introduced it has proved extremely effective in checking the increase of this pest under glass, and large numbers have been distributed during the past few years. The demand has become so great that, in order to meet in a measure the cost of maintaining the parasite over the difficult winter months and packing and despatching it, the Council has fixed a charge of 2s. 6d. for a supply for a small house and 5s. for a large house, and applications for it should be accompanied by the sum named. It is useless to introduce it to houses until the average temperature is about 70° F. Early application should be made since the supply is limited, and it is hoped that Fellows who have found it successful will distribute it in their neighbourhood.

NATIONAL SHOW OF THE AMERICAN PEONY SOCIETY, NEBRASKA.

The President of the Garden Club of Lincoln, Nebraska, wishes us to draw the attention of Fellows to a Peony Conference and Show to be held in Lincoln, Nebraska, on July 12 and 13. She would be very pleased to help any Fellow who desires to visit this Show, and asks them to write to :

The President, Garden Club of Lincoln, 2056 South Eighteenth Street, Lincoln, Nebraska, U.S.A.

WISLEY IN MAY.

The Wisley Gardens during this month will contain much of interest in all the departments, both out of doors and under glass.

On the Trial Grounds near the entrance to the Gardens the Lupins will be flowering. This Trial includes all that is best of these showy and useful plants for the decoration of the border in many shades of colour.

The Alpine House contains a very varied selection of the most useful and attractive plants for this type of house, amongst them *Lewisia*, *Haberlea*, *Ramondia*, *Phlox* and *Pentstemon*. On the rock garden there is, in the many corners and pockets which it provides, a further gathering of plants to interest many who garden in this way; for instance, *Anemones*, *Daphne Cneorum*, *Primulas*, dwarf species of *Rhododendron*, the uncommon *Oursia macrocarpa*, spring-flowering *Gentians*, as well as other plants too numerous to mention. Near the Alpine House is a collection of species of *Tulipa* planted in beds which have a season of bloom extending from March to May.

In the Wild Garden below the Oak trees the sheets of *Primula japonica* colour the ground whilst other species, including *P. chionantha*, less brilliant, perhaps, but not lacking in beauty, grow also in this part of the Gardens. *Meconopsis* in abundance and *Trilliums* also lend their different forms and colours here. Of shrubs *Rhododendrons*, *Camellias*, and the first *Azaleas* will be conspicuous, although the last named will not be at their best until June.

Passing through the Wild Garden into Seven Acres where the principal collection of shrubs is situated, among them are planted very many of the most modern sorts of *Daffodils*, the visitor will see the two tree *Heaths*, *Erica australis* and *E. arborea* var. *alpina*, now in flower, continuing the season after *E. mediterranea* and *E. carnea* and its varieties have passed over. Here also are many species and hybrids of *Cytisus*, and around the various borders can be found *Crab-Apples* (*Malus* spp.) of many kinds, *Berberis* species and hybrids, both evergreen and deciduous, the lovely Japanese *Cherries* in varying shades from white to deep pink, both single and double, the *Pearl Bush* (*Exochorda*), *Cotoneasters*, the *Bird Cherry* (*Prunus Padus*), and *Spiraeas*. In Howard's Field, beyond the Pinetum and Pine Wood, is the comprehensive collection of *Lilacs*, especially worth a visit this month when in their full beauty. In this part also are the species of *Rosa* which also begin to produce their pink, rose, white or yellow blossoms in late May, *Rosa Hugonis* and its hybrids usually leading the procession.

Returning towards the Laboratory there is yet something to be inspected in the glasshouses. In the large Temperate house the curious Bird-of-Paradise plant (*Stralitzia Reginae*) should be seen with its erect crest of orange and blue,

the mauve *Asystasia bella*, orange *Streptosolen* and buff *Diplacus glutinosus*. The second house, nearer the Laboratory, contains *Calceolarias* and *Schizanthus*, whilst in the Half-hardy house *Aster Pappi*, one of the blue South African Daisies, the shrubby mauve *Calceolaria violacea*, *Prostanthera Sieberi*, and lavender *Veronica Hulkeana* and many other plants suitable for cultivation in a cool greenhouse where the temperature maintained is only slightly above freezing point.

HALL LETTINGS.

From May 24 to 28 the Dental Trade Exhibition will be held in the Society's Old and New Halls. If any Fellows are interested in this exhibition they are asked to write to the organizer, G. W. MARTIN, Esq., 1 Warwick Street, Regent Street, W. 1, from whom all particulars may be obtained.

GENERAL MEETINGS.

FEBRUARY 23, 1937 (*cont.*).

NARCISSUS AND TULIP COMMITTEE.—Mr. E. A. BOWLES, M.A., F.L.S., F.R.E.S., V.M.H., in the Chair, and twelve other members present.

The Minutes of the meeting of the Narcissus Classification Sub-Committee held on February 16, which had been circulated, were considered. The Chairman referred to a letter which he had received from Major F. C. Stern regarding the proposal to place *N. minimus* as a synonym of *N. asturiensis* Jordan, and explained why, in his (the Chairman's) view, the nomenclature used in Pugsley's monograph (JOURNAL R.H.S., 58, p. 40) should be followed. The Minutes were adopted.

Awards Recommended :—

Silver Floral Medal.

To Messrs. R. H. Bath, Wisbech, for a group of Daffodils and Tulips.

Flora Medal.

To The Trenoweth Valley Flower Farm, St. Keverne, Cornwall, for a group of Daffodils.

Banksian Medal.

To Mr. R. F. Calvert, Coverack, Cornwall, for a group of Daffodils.

Other Exhibits.

Mrs. R. S. Copley, Chircombe, Bideford : *Narcissus* 'Lilibet' and *N.* 'Ch. 524.' The Committee desired to see the former again, exhibited under the regulations for garden and market varieties.

Mr. R. F. Calvert : *Narcissus* 'Beryl Parr.'

The Trenoweth Valley Flower Farm : *Narcissus* 'Bryher.'

Messrs. D. Stewart, Ferndown, Wimborne, Dorset : Daffodils.

Capt. H. G. Hawker, Strode, Ermington : *Narcissus*, identified as *pumilus* Pugsley, syn. *nanus* Hort.

Daffodil Trials at Gulval. A letter was received from the Committee of the Gulval Experimental Station suggesting that an Award of Merit should be made to Mrs. Whale's stock of *Narcissus maximus superbus*. The Committee reaffirmed its decision that no award be recommended.

JOINT ROCK GARDEN PLANT COMMITTEE.—Viscountess BYNG OF VIMY in the Chair, and six other members present.

Awards Recommended :—

Award of Merit.

To *Cyclamen ibericum* as a flowering plant for the rock garden and alpine house (votes unanimous), from Mrs. Dyson Perrins, Malvern. See p. 173.

To *Saxifraga* × *Sündermannii purpurea* as a flowering plant for the rock garden and alpine house (votes 6 for), from Messrs. W. E. Th. Ingwersen, East Grinstead. See p. 175.

Other Exhibits.

Mrs. G. Anley, Woking : *Saxifraga scardica*.

Mrs. R. Lukin, Burghfield Common : *Asphodelus acaulis*.

Miss E. M. Savory, Olney : *Passerina dioica*.

Mrs. Sebag-Montefiore, Banbury : *Romulea Engleri*.

MARCH 9, 1937.

Sir ARTHUR W. HILL, K.C.M.G., M.A., ScD., F.R.S., F.L.S., V.M.H., in the Chair.

The First Masters Memorial Lecture, 1937, was given by Dr. E. J. SALISBURY, F.R.S., on "The Plant and its Water Supply."

SCIENTIFIC COMMITTEE.—Mr. E. A. BOWLES, M.A., F.L.S., F.R.E.S., V.M.H., in the Chair, and eight other members present.

Acceleration of the rooting of cuttings.—Dr. Tincker showed a series of cuttings of *Myrtus communis* showing acceleration of rooting after standing in a solution of α -naphthalene acetic acid 10^{-5} and also after β -indolyl acetic acid 10^{-5} for 24 hours. The cuttings were inserted on January 11 and had roots about

$\frac{1}{2}$ inch long on February 22. *Tricuspidaria dependens* also rooted more quickly after treatment with α -naphthalene acetic acid 10000 and after β -indolyl acetic acid 10000 (January 28 to February 22). Sections of the stems so treated showed stimulation of cambial activity as well as development of roots.

Fruit for naming.—A long fruit with winged seeds was taken by Mr. A. B. Jackson for comparison. He also took examples of a plant shown by Lady Lawrence.

FRUIT AND VEGETABLE COMMITTEE.—Mr. W. H. DIVERS, V.M.H., in the Chair, and five other members present.

Exhibits.

Mr. Howard H. Crane, Highmead, Cheney Lane, Eastcote, Pinner: Apple 'Newton Wonder.'

R.H.S. Commercial Fruit Trials, Wisley: Apple: 'Woolbrook Russet.'

FLORAL COMMITTEE A.—Mr. J. M. BRIDGEFORD in the Chair, and nineteen other members present.

Awards Recommended:—

Silver Flora Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.

To Messrs. Bath, Wisbech, for Daffodils, Tulips, Hyacinths, etc.

To Mr. G. H. Dalrymple, Bartley, for Freesias.

Silver Banksian Medal.

To Ashington Nurseries, Ltd., Ashington, for Carnations.

To Messrs. Prins, Wisbech, for Hyacinths, Daffodils, Tulips.

To Swanley Horticultural College, Swanley, for Hippeastrums and *Begonia nitida*.

Flora Medal.

To Messrs. Engelmann, Saffron Walden, for Carnations, Euphorbias and Antirrhinums.

To Messrs. Sutton, Reading, for Wallflowers.

Banksian Medal.

To Army Vocational Training Centre, Chisleton, for Cinerarias.

To Messrs. Dobbie, Edinburgh, for Cinerarias.

To Messrs. Low, Enfield, for Carnations.

To Messrs. Napier, Taunton, for Carnations.

To Messrs. Wakeley, London, for Daffodils and Crocuses.

Other Exhibits.

Messrs. Gill, Penryn: Anemones, etc.

Hoxne Gardens, Diss: Primroses and Polyanthus.

F. M. Remnant, Esq., Edenbridge: Cyclamen 'Adeline.'

FLORAL COMMITTEE B.—Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and twenty other members present.

Awards Recommended:—

Silver-gilt Banksian Medal.

To Messrs. Clarence Elliott, Stevenage, for Saxifrages and other rock garden plants.

Silver Flora Medal.

To Messrs. Bedford & Page, Cambridge, for Saxifrages and other rock garden plants.

To Messrs. Cheal, Crawley, for Cherries and other flowering shrubs.

To Messrs. Waterer, Bagshot, for Cherries and other flowering shrubs.

Silver Lindley Medal.

To F. Barker, Esq., Stevenage, for varieties of *Primula Allionii*.

Silver Banksian Medal.

To Capt. W. D. Coode, Truro, for Rhododendrons and Magnolias.

To Messrs. Hillier, Winchester, for Cherries and other flowering shrubs.

To Hocker Edge Gardens, Cranbrook, for bulbous and rock garden plants.

To Messrs. Prichard, Christchurch, for rock garden plants.

To Messrs. Russell, Windlesham, for Cherries and other flowering shrubs.

To Mr. G. E. Welch, Cambridge, for rock garden plants.

Flora Medal.

To Alpine Nurseries, West Moors, for rock garden plants.

To Messrs. Barr, Taplow, for Narcissi and other bulbous plants.

MARCH 23, 1937.

CYMBIDIUM TROPHY COMPETITION.

The Cymbidium Trophy for the best exhibit of 12 Cymbidium Plants species and/or hybrids was awarded to the Hon. H. S. Tufton, Englefield Green.

The Second Masters Memorial Lecture, 1937, was given by Dr. E. J. SALISBURY, F.R.S., on "The Plant and its Water Supply." Chairman, Professor F. E. WEISS, D.Sc., LL.D., F.R.S., F.L.S.

SCIENTIFIC COMMITTEE.—MR. E. A. BOWLES, M.A., F.L.S. F.R.E.S., V.M.H., in the Chair, and eight other members present.

Maesa indica, etc.—It was reported that the white-fruited shrub shown by Lady Lawrence at the last meeting (p. lxxv) had been identified as *Maesa indica* (Myrsinaceae). The fruit taken by Mr. A. B. Jackson was found to be a species of *Bignonia*.

Crocus vernus—Mr. Jackson showed a *Crocus* (*C. vernus*) which had become naturalized in fields near Inkpen.

Flowers of Greengage—Mr. M. B. Crane showed a photograph of flowering shoots of trees which had been obtained under the name of Old Greengage showing great variation in the stage of development of foliage at flowering time, from almost unopened foliage buds to well-developed leaves. The fruit in all instances had been of the old greengage type.

Aroid from Siam.—Mr. Bowles showed an Aroid from Siam which Mr. Jackson took to identify.

Rhododendron hybrid.—Mr. Scrase-Dickins showed a fine hybrid between *Rhododendron repens* ♀ and *R. neriiflorum* ♂ in which the calyx was developed into a coloured cup $\frac{1}{2}$ inch in depth, the colour being almost as deep as that of the corolla. The plant grows to about a foot in height and flowers freely.

Fossil wood.—Mr. Bowles also showed a piece of fossil wood which Dr. Barnes took for further examination.

FRUIT AND VEGETABLE COMMITTEE.—MR. W. H. DIVERS, V.M.H., in the Chair, and thirteen other members present.

Exhibits.

R.H.S. Commercial Fruit Trials, Wisley : Apples 'Monarch' and 'Thorpe's Peach.'

Mr. A. P. Kitcat, Northland Cottage, Tetbury, Gloucestershire : seedling Apple.

FLORAL COMMITTEE A.—MR. J. M. BRIDGEFORD in the Chair, and seventeen other members present.

Awards Recommended :—

Gold Medal.

To Messrs. Sutton, Reading, for Hyacinths.

Silver Flora Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.

To Mr. G. H. Dalrymple, Bartley, for Freesias.

Silver Banksian Medal.

To Messrs. Bath, Wisbech, for Daffodils, Tulips, Irises, Hyacinths, etc.

To Messrs. Engelmann, Saffron Walden, for Carnations, Antirrhinums, Pansies, etc.

To Messrs. van Meeuwen, Heemstede, Holland, for Freesias.

To Messrs. Wakeley, London, for Hyacinths.

Flora Medal.

To the Ashington Nurseries, Ashington, for Carnations.

Banksian Medal.

To Messrs. Low, Enfield, for Carnations.

To Messrs. Napier, Taunton, for Carnations.

Selected for trial at Wisley.

Primula malacoides 'Fascination' and *Primula malacoides* 'Melody,' from Messrs. Watkins & Simpson, London.

Other Exhibits.

Messrs. Clark, Dover : Primroses.

Hoxne Gardens, Diss : Primroses and Polyanthus.

Mr. H. W. Mills, Uffculme : Primroses and Polyanthus.

Messrs. Sanders, St. Albans : *Anthurium Rothschildianum* var. 'Nebulae.'

Messrs. van Meeuwen, Heemstede, Holland : *Zantedeschia ethiopica* 'White Giant.'

FLORAL COMMITTEE B.—Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and eighteen other members present.

Awards Recommended :—

Gold Medal.

To Messrs. Waterer, Bagshot, for Japanese Cherries.

Silver Banksian Medal.

To Messrs. Cheal, Crawley, for Cherries, Magnolias and other flowering shrubs.

To Messrs. Clarence Elliott, Stevenage, for Saxifrages and other rock plants.

To Messrs. Russell, Windlesham, for Camellias, Lilacs and other flowering shrubs.

Flora Medal.

To Messrs. Bedford & Page, Cambridge, for rock garden plants.

To Hocker Edge Gardens, Cranbrook, for bulbous plants.

To Messrs. Hollamby, Groombridge, for flowering shrubs.

To Messrs. Prichard, Christchurch, for rock garden plants.

To Messrs. Reuthe, Keston, for flowering shrubs.

To Mr. G. E. Welch, Cambridge, for rock garden plants.

Banksian Medal.

To Alpine Nurseries, West Moors, for rock garden plants.

To Messrs. Barr, Taplow, for Narcissi and other bulbous plants.

To Brookside Nurseries, Oxford, for rock garden plants.

To Messrs. Burkwood & Skipwith, Kingston, for flowering shrubs.

To Mr. E. Ladhams, Elstead, for rock garden plants.

To Messrs. Stuart Low, Enfield, for Camellias and Azaleas.

To Marsden Nurseries, Ashted, for rock garden plants.

To Messrs. Maxwell & Beale, Broadstone, for rock garden plants.

To Messrs. Neale, Worthing, for succulents.

To Messrs. Rogers, Southampton, for rock garden plants.

To Messrs. Waterer, Twyford, for rock garden plants.

To Mr. W. Wells, jun., Merstham, for rock garden plants.

Cultural Commendation.

To Messrs. Russell, Windlesham, for a large plant of *Clematis macropetala* var. *Markhamii*.

Other Exhibits.

Messrs. Burkwood & Skipwith, Kingston : *Osmarea* × *Burkwoodii*.

Messrs. Cheal, Crawley : rock garden plants.

Messrs. Fielden & Crouch, Wrotham : rock garden plants.

Mr. J. W. Forsyth, Luton : *Leucocoryne ixoides* var. *odorata*.

Messrs. Garways, London, W.C. : succulents.

Miss Hopkins, Coulsdon : rock garden plants.

Mr. J. Klinkert, Richmond : clipped Box trees.

Mr. L. Lawrence, Taplow : succulents.

Messrs. Oliver & Hunter, Moniaive : *Erica carnea* 'Springwood Pink.'

Messrs. Redgrove & Patrick, Sevenoaks : flowering shrubs.

Sandon Nurseries, Chelmsford : rock garden plants.

Messrs. Stewart, Ferndown : flowering shrubs.

Walton Park Nurseries, Walton : shrubs and rock garden plants.

Waterperry House School, Oxford : rock garden plants.

White House Gardens, Abergavenny : rock garden plants.

Mr. R. Colpoys Wood, West Drayton : evergreen shrubs.

ORCHID COMMITTEE.—Sir JEREMIAH COLMAN, Bt., in the Chair, and fifteen other members present.

Awards Recommended :—

Gold Medal.

To Messrs. H. G. Alexander, Tetbury, Glos., for a group of Orchids.

Silver-gilt Flora Medal.

To Mrs. Walter Burns, North Mymms Park, Hatfield, for Cymbidiums.

To Guy P. Harben, Esq., Lower Brook, King's Somborne, Hants, for Cymbidiums.

To Messrs. Sanders, St. Albans, for a group of Orchids.

To Messrs. Armstrong & Brown, Tunbridge Wells, for Cymbidiums.

First-class Certificate.

To *Cymbidium* × 'Jason' var. *magnificum* (*Alexanderi* × 'Miranda') (votes 10 for, 5 against), from the Hon. H. S. Tufton, Castle Hill, Englefield Green, Surrey. See p. 221.

To *Cymbidium* × 'Lyoth' var. 'Rosy Morn' ('Ceres' × *insigne*) (votes 14 for), from the Hon. H. S. Tufton. See p. 222.

To *Cymbidium* × 'Mopaa,' Orchidhurst var. ('Lettie' × 'Memoria P. W. Janssen') (votes 8 for, 4 against), from Messrs. Armstrong & Brown. See p. 222.

Award of Merit.

To *Cymbidium* × 'Jason' var. *exquisitum* (*Alexanderi* × 'Miranda') (votes 14 for), from the Hon. H. S. Tufton. See p. 221.

To *Cymbidium* × 'Lillian Sander' var. 'Leo' ('Erica Sander' × *insigne*) (votes 12 for), from Messrs. Sanders, St. Albans. See p. 221.

To *Laeliocattleya* × 'Nephtys' var. *superba* (*Cattleya* × 'Fabia' × *L.-c.* × 'Spalatro') (votes 11 for, 4 against), from Messrs. H. G. Alexander. See p. 223.

To *Cymbidium* × 'Janette,' Harben's var. (*Alexanderi* × 'Joy Sander') (votes 10 for, 1 against), from Guy P. Harben, Esq. See p. 221.

To *Cymbidium* × 'Janette' var. 'Peach Blossom' (votes unanimous), from Guy P. Harben, Esq. See p. 221.

To *Cymbidium* × 'Woodcock' var. 'Bronze King' (*Alexanderi* × 'Firefinch') (votes 12 for, 2 against), from Sir William Cooke, Bt., Wyld Court, Hampstead Norris, Berks. See p. 222.

Silver Trophy for an exhibit of 12 Cymbidiums.

To the Hon. H. S. Tufton, Castle Hill, Englefield Green, Surrey.

Cultural Commendation.

To Mr. G. Boxall, gardener to T. Harrison Hughes, Esq., Eddington House, Hungerford, Berks, for *Lycaste* × *Balthae*, with 22 flowers.

Other Exhibits.

Capt. G. S. Brocklebank, Chingley Manor, Flimwell, Kent: a group of *Cymbidiums*.

E. Kenneth Wilson, Esq., "Cannizaro," Wimbledon: a group of *Cymbidiums*.

Messrs. McBean, Cooksbridge: a group of Orchids.

Messrs. Charlesworth, Haywards Heath: a group of Orchids.

Messrs. Stuart Low, Jarvis Brook, Sussex: a group of Orchids.

Messrs. H. Dixon, Wandsworth: a group of Orchids.

NARCISSUS AND TULIP COMMITTEE.—Mr. E. A. BOWLES, M.A., F.L.S., F.R.E.S., V.M.H., in the Chair, and seventeen other members present.

Awards Recommended:—

Silver-gilt Banksian Medal.

To Mr. J. L. Richardson, Prospect House, Waterford, for an exhibit of Daffodils.

To Messrs. Dobbie, Edinburgh, for an exhibit of double Tulips.

Silver Flora Medal.

To Mr. Guy L. Wilson, Broughshane, co. Antrim, for an exhibit of Daffodils.

To Mr. R. F. Calvert, Coverack, Cornwall, for an exhibit of Daffodils.

To Messrs. Barr, King Street, Covent Garden, W.C. 2, for an exhibit of Daffodils.

Silver Banksian Medal.

To The Trenoweth Valley Flower Farm, St. Keverne, Cornwall, for an exhibit of Daffodils.

To the Donard Nursery Company, Newcastle, co. Down, for an exhibit of Daffodils.

Other Exhibits.

Messrs. D. Stewart, Ferndown, Wimborne: a group of Daffodils.

Lady Muspratt, Ockwells Manor, Bray, Berkshire: *Tulipa stellata*.

C. F. Coleman, Esq., Broomhill, Hartley, Cranbrook: *Narcissus Bulbocodium* var. *nivalis*.

G. P. Baker, Esq., V.M.H., Hillside, Oakhill Road, Kippington, Sevenoaks: *Narcissus Bulbocodium* var. from the Riff Mountains.

W. F. M. Copeland, Esq., 156 St. James's Road, Southampton: seedlings of *Narcissus minor*.

(To be continued.)

EXTRACTS FROM THE PROCEEDINGS

OF THE

ROYAL HORTICULTURAL SOCIETY.

NOTICES TO FELLOWS.

DAFFODIL SHOW.

The Daffodil Show, which was held on April 15 and 16, and of which fuller particulars will be found on pp. xc, xcii, received greater support this year than ever before, both from visitors and exhibitors, and it was pleasing to be able to note amongst the latter a number of new names.

CLASSIFIED LIST OF DAFFODILS.

The Classified List of Daffodil Names has been revised and brought up to date, and is now obtainable from the Secretary, price 1s., or post free 1s. 2d.

Since the last Classified List was printed, in 1933, over 800 new Daffodil names have been registered by the Society, and the new edition consequently contains references to over 7,600 Daffodils. In addition to the full classification of each variety, the name of the raiser and the approximate date of raising is given.

This publication should be of interest to all who are concerned with the raising, showing or selling of Daffodils.

GIFT TO THE SOCIETY.

It is a pleasure to be able to record a further gift to the Society from Mr. W. J. Stables, who has kindly presented a very interesting collection of lantern slides of Orchids, and some books, for which the Society is deeply grateful.

HORTICULTURAL COLOUR CHART.

While it is still possible, it is now rather doubtful whether the first volume of the Horticultural Colour Chart will appear this month. The collation of the grading of the colours and of the information to be supplied on each sheet has proved rather a larger undertaking than was at first anticipated, but everything will be done to expedite the publication of this work which it is believed will be of the greatest value to all concerned with the colours of plants.

Applications for the first volume of the Colour Chart at the price of 10s. a volume, exclusive of postage, can be accepted up to the date of publication. After that date copies can only be supplied at that price until the Society's stock is exhausted, when the price will be £1 1s. a copy.

CALENDAR.

June 4, Teachers' Advanced Practical Examination at Wisley.

June 8, 12 noon to 7.30 P.M.—Fortnightly Meeting and Show of Flowers in season. There will be two competitions on this occasion, the Sewell Medal Competition for Alpines, and a competition for Shrubs. See pp. lxxxii, lxxxiii.

June 8, 1 to 7.30 P.M.—Iris Society's Show in the Old Hall.

At 3.30 P.M. on *June 8*, in the Lecture Room of the New Hall, there will be a meeting of the Iris Group, when Major F. C. Stern will open a discussion on "Irisess." See p. lxxxiii.

lxxxii PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

June 9, 10 A.M. to 5 P.M.—Fortnightly Meeting and Show of Flowers in Iris Society's Show, continued.

At 3.30 P.M. on *June 9*, in the Lecture Room of the New Hall, a lecture will be given under the auspices of the Institute of Landscape Architects on "Landscape Architecture in America." Fellows interested in that subject are invited to attend.

June 14-18.—Preliminary practical examinations for the National Diploma in Horticulture at Wisley.

June 22, 12 noon to 7.30 P.M.—Fortnightly Meeting and Show of Flowers in season. On this occasion the London and South of England Viola and Pansy Society will stage their annual show.

June 22, 1 to 7.30 P.M.—Cactus and Succulent Society's Show in the Old Hall.

At 3.30 P.M. on *June 22*, in the Lecture Room of the New Hall, Mr. R. S. Lynch will lecture on "Gardens of Easy Maintenance."

At 4.30 P.M. on *June 22*, in the Restaurant of the Old Hall, there will be a Lily Group Discussion on "Nomocharis." See p. lxxxiv.

June 23, 10 A.M. to 5 P.M.—Fortnightly Meeting and Show of Flowers in season, and Cactus and Succulent Society's Show, continued.

June 22-25.—Final Practical Examinations for the National Diploma in Horticulture at Wisley.

July 1 (Thursday), 1 to 7.30 P.M.—British Delphinium Society's Show in the New Hall.

July 3, Lily Group Visit to Gardens. See p. lxxxiv.

July 6, 12 noon to 7.30 P.M.—Fortnightly Meeting and Show of Lilies and other flowers in season. At this Show there will be special competitions for Lilies, particulars of which will be found on pp. lxxxiii, lxxxiv.

July 6, 1 to 7.30 P.M.—Alpine Garden Society's Show in the Old Hall.

At 3.30 P.M. on *July 6*, in the Lecture Room of the New Hall, the Lily Group will meet and discuss "Lilies Exhibited."

At 7 P.M. on *July 6*, in the Restaurant of the New Hall, the Lily Group Dinner will take place, following which there will be a discussion on "The Decorative Value of Lilies." See p. lxxxiv.

July 7, 10 A.M. to 5 P.M.—Fortnightly Meeting and Show of Lilies and Flowers in season, and Alpine Garden Society's Show, continued.

July 9, 1 to 7.30 P.M.—Civil Service Horticultural Federation's Exhibition, in the New Hall.

July 13, 1 to 7.30 P.M.—National Carnation and Picotee Society's Diamond Jubilee Show in the Old Hall.

July 14, 10 A.M. to 5 P.M.—National Carnation and Picotee Society's Diamond Jubilee Show, continued.

July 16, 2.30 to 9 P.M.—London Gardens Society Exhibition of Flowers in the New Hall.

July 17, 10 A.M. to 6.30 P.M.—London Gardens Society Exhibition of Flowers, continued.

July 20, 12 noon to 7.30 P.M.—Fortnightly Meeting and Show of Flowers in season. On this occasion there will be three competitions, one for the best hybrid Lily (continued from the last show), one for Scented Roses, for which the Clay Cup will be awarded, and one for Hardy Flowers. Full particulars will be found on pp. lxxxiii, lxxxiv.

At 3.30 P.M. on *July 20*, in the Lecture Room of the New Hall, Major G. Churcher will lecture on "The Modern Gladiolus."

July 21, 10 A.M. to 5 P.M.—Fortnightly Meeting and Show of Flowers in season, continued.

July 21 and 22, 2 P.M. to 4 P.M.—Practical Demonstration at Wisley on Summer Pruning of Fruit Trees and Shrubs. See p. lxxxiv.

HALL LETTINGS.

On *June 30* and *July 1* the Southwark Catholic Society is holding an Exhibition of Handcrafts and Dairy Work in the Old Hall. Fellows who desire further particulars of this exhibition are asked to write to the organizer, The Rev. Canon Cree, whose address is 57 Westminster Bridge Road, London, S.E. 1.

SEWELL MEDAL COMPETITION.

The Sewell Medal is awarded for exhibits of plants suitable for the rock garden or alpine house. At the fortnightly show on *June 8* a Sewell Medal is offered for an amateur's exhibit of three pots or pans not exceeding 12 inches

in diameter if circular, or 112 square inches in internal area if rectangular. Only one subject may be shown in each pot or pan, but it is not necessary that the plants should have been grown in the receptacles in which they are shown; if desired, plants may be lifted and potted for the purposes of the competition. Not fewer than two-thirds of the plants in each exhibit must be in bloom, and plants which are not in bloom should possess decorative value when shown. The scale of points for judging will be as follows: suitability, 24 points; rarity, 18 points; cultivation, 24 points.

Entries must be made on special forms obtainable from the Secretary, by whom the completed forms must be received not later than by the first post on Wednesday, June 2.

COMPETITIVE CLASSES FOR AMATEURS.

i. Shrubs.

At the Fortnightly Show on *June 8* there will be two competitive classes for exhibits of shrubs sent in by amateurs:

Class A: 8 vases of hardy shrubs, 8 varieties, not more than 2 of any one genus.

First prize, 60s.; Second, 45s.; Third, 10s.

Class B: 1 vase of a hardy shrub.

First prize, 20s.; Second, 15s.; Third, 10s.

Entries should be made on special forms obtainable from the Secretary, by whom the completed forms must be received not later than by the first post on Wednesday, June 2.

ii. Lilies.

At the Fortnightly Show on *July 6* there will be two competitive classes for exhibits of Lilies sent in by amateurs:

Class A: 8 species and/or hybrids of *Lilium*, 1 stem of each, cut or on plant.

First prize, 60s.; Second, 45s.; Third, 30s.

Class B: 1 stem of *Lilium*, cut or on plant.

First prize, 20s.; Second, 15s.; Third, 10s.

Entries should be made on special forms obtainable from the Secretary, by whom the completed forms must be received not later than by the first post on Wednesday, June 30.

iii. Hardy Flowers.

At the Fortnightly Show on *July 20* there will be two competitive classes for exhibits of Hardy Flowers sent in by amateurs:

Class A: 12 kinds of hardy flowers, 1 vase of each. Annuals, biennials, shrubby plants and trees, and plants which have been wintered under glass, excluded; bulbous plants allowed.

First prize, 60s.; Second, 45s.; Third, 30s.

Class B: 1 vase of a hardy flower. Annuals, biennials, shrubby plants and trees and plants which have been wintered under glass, excluded; bulbous plants allowed.

First prize, 20s.; Second, 15s.; Third, 10s.

Entries should be made on special forms obtainable from the Secretary, by whom the completed forms must be received not later than by the first post on Wednesday, July 14.

IRIS GROUP.

By arrangement with the Iris Society there will be a meeting of the Iris Group on June 8 at 3.30 P.M. in the Lecture Room of the New Hall, when Major F. C. Stern, O.B.E., M.C., F.L.S., will lecture on "Irises."

This will be the second Group meeting of the year, and all Fellows of the Royal Horticultural Society and members of the Iris Society are invited to attend.

This Iris Group is organized on the lines of the Lily Group, and the Secretary will be pleased to register the names of any persons who are especially interested in the Iris.

LILY GROUP.

The Lily Group consists of Fellows and Associates of the Royal Horticultural Society who are especially interested in Lilies, *Nomocharis* and *Fritillaries*. Its object is to provide members with facilities for meeting to exchange views upon these plants. Those who wish to join should apply in writing to the Secretary, who notifies members by post of all meetings.

Three of the five meetings arranged for this year's programme take place during the months of June and July. The first, on Tuesday, June 22, will be held at 4.30 P.M. in the Restaurant of the Old Hall, when the subject for discussion will be "*Nomocharis*."

The second, on Saturday, July 3, takes the form of a visit to the garden of Major the Hon. John Astor, M.P., at Haver Castle, Edenbridge; the nurseries of Messrs. W. A. Constable, Ltd., at Southborough, Tunbridge Wells; and the Hocker Edge Gardens, Cranbrook. Members of the Group will receive full particulars of these visits by post.

The third takes place on July 6, the occasion of the Fortnightly Show, when Lilies are to be the special feature. The Group will meet at 3.30 P.M. in the Lecture Room of the New Hall when "*The Lilies Exhibited*" will be discussed.

All members are cordially invited to take part in these discussions, and to bring plants, cut blooms, photographs or lantern slides bearing upon the subject under discussion. Inquiries from beginners are always welcomed.

At 7 P.M. on July 6 the members of the Group and their friends will dine together in the Restaurant of the New Hall, and after dinner there will be a discussion on "*The Decorative Value of Lilies*."

Particulars of the Dinner will be sent to all members of the Group in due course.

MEDAL OFFERED FOR NEW HYBRID LILY.

A Banksian Medal is offered for award to the amateur who exhibits at the Fortnightly Show on July 6 and 7 or at the Fortnightly Show on July 20 and 21, 1937, the best hybrid Lily which has not received a Certificate of Preliminary Commendation, an Award of Merit, or a First Class Certificate beforehand. All entries for this Medal must be made on forms obtainable from the Secretary, by whom the completed forms must be received not later than by the first post on Wednesday, June 30, or Wednesday, July 14.

CLAY CUP FOR ROSES.

On Tuesday, July 20, the Clay Cup will be offered to the raiser of a Rose of good form and colour, not in commerce before the current year, and possessing the true old rose scent, such as may be found in the old '*Cabbage*' or '*Provence*' Rose, in '*General Jacqueminot*,' '*Marie Baumann*,' '*Duke of Wellington*,' '*General McArthur*,' etc. The scent known as "*tea rose*" is not, for the purpose of the competition, to be counted the true old rose scent. Not more than three different varieties may be shown by one competitor, and at least three and not more than six blooms or trusses of each variety will be required, together with a plant in flower and bud. The cup will be awarded only once for the same Rose. This competition is open to trade and amateur growers, and entries must be made on special forms obtainable from the Secretary, by whom the completed forms must be received not later than by the first post on Wednesday, July 14.

PRACTICAL DEMONSTRATION AT WISLEY.

On July 21 and 22 there will be a demonstration at the Gardens at Wisley between the hours of 2 and 4 P.M. (weather permitting) on Summer Pruning of Fruit Trees and Shrubs. Fellows intending to be present on either of these days should notify the Director, R.H.S. Gardens, Wisley, Ripley, Surrey, beforehand, so that adequate arrangements can be made.

ERLESTOKE PARK, WILTSHIRE.

As further circulars in reference to Erlestoke Park, Wiltshire, have been received at the Society's offices, it is desired to draw Fellows' attention to the statement which has already been published in the JOURNAL from time to time:

"In view of inquiries received and in order to avoid any misunderstanding on the part of the Fellows of the Royal Horticultural Society, the Council of the Society wishes it to be known that the appeal which has been made in connexion with Erlestoke Park, Wiltshire, has not been in any way made with the support, or under the auspices, of the Society."

SMALL EXHIBITS FROM FELLOWS.

Most Fellows have from time to time some plant, flower, fruit or vegetable which, because it is uncommon or especially well grown, would be of interest to other Fellows if it were exhibited at one of the Fortnightly Meetings. The Council hopes that Fellows will keep this in mind and make use of the Small Exhibits Table on the dais. It is not necessary to apply beforehand for space on this special table, but Fellows are asked to bring their exhibits by 12 noon on the first day of a meeting, and to hand them to the clerk who is in attendance on the dais up to that hour, and who will provide cards to go with the exhibits. No exhibit staged under this arrangement should consist of more than three pots, vases or dishes.

WHITE FLY PARASITE.

Where the parasite of the greenhouse white fly, *Encarsia formosa*, has been introduced, it has proved extremely effective in checking the increase of this pest under glass, and large numbers have been distributed during the past few years. The demand has become so great that, in order to meet in a measure the cost of maintaining the parasite over the difficult winter months and packing and despatching it, the Council has fixed a charge of 2s. 6d. for a supply for a small house and 5s. for a large house, and applications for it should be accompanied by the sum named. It is useless to introduce it to houses until the average temperature is about 70° F. Early application should be made since the supply is limited, and it is hoped that Fellows who have found it successful will distribute it in their neighbourhood.

INSPECTION OF GARDENS.

Many Fellows may not be aware of the terms under which their gardens can be inspected by the Society's Garden Inspector, and advice given thereon. They are set out below, and it will be seen that special arrangements can be made when Fellows living in the same district co-operate.

"The inspection of gardens belonging to Fellows is conducted by a thoroughly competent Inspector from the Society who reports and advises at the following cost, viz.: a fee of £3 3s. for one day, or £5 5s. for two consecutive days, together with all out-of-pocket expenses. No inspection may occupy more than two days, save by special arrangement. Should two or more Fellows residing in the same district, with their gardens within easy reach of one another, desire to have the services of the Garden Inspector, arrangements will be made for such a combined inspection and the fee and expenses divided by consent of those concerned. Fellows wishing for the services of an Inspector are requested to give at least a week's notice and choice of two or three days, and to indicate the most convenient railway station and its distance from their garden. Gardens can only be inspected at the written request of the owner."

WISLEY IN JUNE.

The Gardens during this month are probably more attractive than at any other period of the year, both for the quantity as well as the variety of bloom in the various departments of the grounds.

Greenhouses.—In the half-hardy collection of plants in the first house nearest the Laboratory the following may be expected to be in flower: *Ebenus cretica*, *Lotus Bertholletii*, *Pimelea ferruginea*. In another greenhouse will be found a collection of Fuchsias and Cape Pelargoniums, with flowering shrubs, and plants suitable for roof climbers.

On the Peach Wall, which is passed on the way to the Wild Garden, are several hybrids of *Ceanothus*, which should be at their best now, and opposite this is the collection and trial of the newer Bearded Iris.

Near the collection of Pears many varieties of herbaceous Paeonies are established.

Floral Trials.—The floral trials contained within the area surrounded by Hornbeam hedges contain numerous varieties of Sweet Peas, Delphiniums, Sidalceas, Border Carnations, Lupins, perennial and annual, Gladioli, Bedding Lobelias, Montbretias and annual early double China Asters.

Alpine House.—Although the attractiveness of this house will be past its zenith, there will still be many plants of interest deserving the attention of cultivators of this popular class of plants. Among these may be mentioned *Phlox mesoleuca*, *Lewisia*, *Conandron ramondiioides*, *Campanula* species, and others suitable for including in a greenhouse of this description.

Rock Garden.—On the rock garden itself some of the principal genera now attractive are *Primula*, *Meconopsis*, *Nomocharis*, *Phlox*, *Geranium*, and *Lewisia*, though this by no means exhausts the names of those plants likely to be blooming in this part of the garden during June.

Wild Garden.—Here the display of *Rhododendrons*, *Kalmias*, *Cornus* in various species, the earlier *Lilies*, including *Lilium rubellum* which succeeds so well at Wisley, and *L. Szovitsianum*, help to make this section of the Garden of special interest.

Seven Acres will contain a considerable interest in such genera as *Buddleia*, *Genista*, *Spiraea*, *Deutzia*, *Philadelphus*, *Escallonia* and *Viburnum*. Leading from this portion of the Garden the Herbaceous borders will be fast approaching their best, and near at hand may be seen the fine collection of *Day Lilies*, *Hemerocallis*, including all that are considered the best in cultivation.

Those who desire to see the collection of *Rose* species will find them in *Howards Field*, which may be reached by a walk along the path by the river *Wey*, where also will be found many hybrids and old-fashioned *Roses* of the *Damask*, *Centifolia*, and other groups. In the sandy soil here, *Cistus* and *Helianthemum* thrive and present a good show of varied colour.

GENERAL MEETINGS.

MARCH 23, 1937 (*cont.*).

JOINT RHODODENDRON COMMITTEE.—Mr. J. B. STEVENSON in the Chair, and ten other members present.

Awards Recommended :—*First-class Certificate.*

To *Rhododendron* × 'Little Ben' (*R. neriiflorum* × *R. repens*) (votes 6 for, 3 against), from C. Scrase-Dickins, Esq., Coolhurst, Horsham. See p. 224.

Award of Merit.

To *R.* × 'Bo-peep' (votes 8 for), from Lionel de Rothschild, Esq., Exbury House, Southampton. See p. 223.

To *R. Macabeum* (votes 8 for, 1 against), from Lieut.-Col. E. H. W. Bolitho, Trengwainton, Penzance. See p. 224.

Other Exhibits.

Lionel de Rothschild, Esq. : *R.* × 'Androcles,' and *R.* × 'Androcles' var. (a spotted form).

The Earl of Stair, Lochinch, N.B. : *R. sulfureum* (to be seen again), *R. leucaspis*, *R. nobile*, and *R. Valentinianum*.

JOINT ROCK GARDEN PLANT COMMITTEE.—Viscountess BYNG in the Chair, and eight other members present.

Awards Recommended :—*Award of Merit.*

To *Kalmiopsis Leachiana* as a hardy flowering shrub for the rock garden or alpine house (votes 6 for), from Mrs. G. Anley, St. George's, Wych Hill Lane, Woking. See p. 223.

To *Soldanella alpina* as a flowering plant for the rock garden or alpine house (votes 7 for), from G. P. Baker, Esq., "Hillside," Kippington, Sevenoaks. See p. 224.

To *Soldanella pusilla* as a flowering plant for the rock garden or alpine house (votes 6 for), from G. P. Baker, Esq., Sevenoaks. See p. 224.

Cultural Commendation.

To Mr. J. P. Shanahan, gardener to G. P. Baker, Esq., Sevenoaks, for a pan of *Saxifraga Stuartii lutea*.

To Mr. J. P. Shanahan, for an exceptionally well-flowered pot of *Soldanella alpina*.

Other Exhibits.

G. P. Baker, Esq., Sevenoaks : *Fritillaria Sibthorpiana* (E.K.B. 932A.), *Saxifraga* × 'Crystalie,' *S. scardica rosea*.

Lady Gregory, Shoreham, Sevenoaks : *Paraquilegia grandiflora* (K.W. 10524).

Messrs. M. & H. Mills, Uffculme, Devon : *Primula Wanda* 'Craddock White.'

APRIL 6, 1937.

Mr. P. ROSENHEIM in the Chair.

A lecture was given by Mr. W. B. TURRILL, D.Sc., on "Fritillaries in the Balkan Peninsula and in Asia Minor."

SCIENTIFIC COMMITTEE.—Mr. E. A. BOWLES, M.A., F.L.S., F.R.E.S., V.M.H., in the Chair, and seven other members present.

Aroid from Siam.—Mr. Jackson reported that the Aroid taken by him proved to be a form of *Colocasia antiquorum*.

Native dyes.—Mr. Jackson also showed a series of pieces of wool dyed with extracts of bark of various trees and with some other plant extracts.

Green Primrose.—Mrs. Goddard, of Cadgwith, Cornwall, sent a green primrose in which the sepals were foliose and the petals, etc., green and somewhat leaf-like.

Fasciated Forsythia.—Mr. H. H. Crane sent a shoot of *Forsythia intermedia* showing fasciation with the usual curvature at the apex which fasciated specimens of this plant show.

Colour varieties of Viola odorata.—Miss Armitage, of Dadnor, Ross, sent a bunch of colour-forms of *Viola odorata* including white, reddish lilac, purple, sulphur and violet, and a newly discovered form found in a hedgerow in her garden with pale flowers with a dark spur.

FRUIT AND VEGETABLE COMMITTEE.—Mr. W. H. DIVERS in the Chair, and nine other members present.

Exhibits.

Mr. W. Bennetts, Oaklea, Ramshill, Petersfield, Hants: Apple 'Emily Bennetts.'

Mr. W. C. Modral, The Gardens, Old Warden Park, Biggleswade, Beds: Apple 'Winter Banana'?

R.H.S. Commercial Fruit Trials, Wisley: Apple 'Crawley Beauty.'

Mr. H. Barnett, Westwood House, Tilehurst, nr. Reading: Persian Sugar Quince Jam.

FLORAL COMMITTEE A.—Mr. J. M. BRIDGEFORD in the Chair, and fifteen other members present.

Awards Recommended:—

Silver-gilt Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.

Silver Banksian Medal.

To Ashington Nurseries, Ltd., Ashington, for Carnations.

To Mr. G. H. Dalrymple, Bartley, for Freesias.

To Messrs. Engelmann, Saffron Walden, for Carnations, Antirrhinums and Pansies.

Flora Medal.

To Messrs. Blackmore & Langdon, Bath, for Polyanthus.

To Messrs. S. Low, Enfield, for Carnations.

To Messrs. Napier, Taunton, for Carnations.

Banksian Medal.

To Messrs. F. Cant, Colchester, for Roses.

To Miss C. Christy, Chelmsford, for Primroses and other hardy plants.

To Mr. J. Douglas, Great Bookham, for Auriculas.

To Messrs. Gill, Penryn, for Anemones.

To Messrs. Toogood, Southampton, for Polyanthus.

Other Exhibits.

Messrs. Clark, Dover: Primroses.

Mr. H. G. Longford, Abingdon: Polyanthus.

FLORAL COMMITTEE B.—Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and fifteen other members present.

Awards Recommended:—

Silver-gilt Banksian Medal.

To Messrs. Waterer, Bagshot, for Rhododendrons, Cherries and other flowering shrubs.

To Hocker Edge Gardens, Cranbrook, for bulbous and alpine plants.

Silver Flora Medal.

To Messrs. Russell, Windlesham, for Azaleas, Clematis and other flowering shrubs.

Silver Banksian Medal.

To Messrs. Hillier, Winchester, for Cherries and other flowering shrubs.

To Messrs. Stuart Low, Enfield, for Camellias and other flowering shrubs.

To Mr. W. J. Marchant, Wimborne, for Shortias, Cherries and other flowering shrubs.

Flora Medal.

To Messrs. Clarence Elliott, Stevenage, for Primulas and other rock garden plants.

To Messrs. Gill, Penryn, for Rhododendrons.

To Mr. E. Ladhams, Elstead, for rock garden plants.

To Walton Park Nurseries, Walton, for flowering shrubs.

To Messrs. Wm. Wood, Taplow, for rock garden plants and shrubs.

Banksian Medal.

- To Alpine Nurseries, West Moors, for rock garden plants.
- To Messrs. Barr, Taplow, for bulbous plants.
- To Messrs. Bedford & Page, Cambridge, for rock garden plants.
- To Brookside Nurseries, Oxford, for rock garden plants.
- To Chez Nous Nurseries, Newick, for rock garden plants.
- To Mr. J. Klinkert, Richmond, for clipped Box trees.
- To Mr. L. Lawrence, Taplow, for succulents.
- To Marsden Nurseries, Ashted, for rock garden plants.
- To Orchard Neville Nurseries, Glastonbury, for rock garden plants.
- To Messrs. Reuthe, Keston, for flowering shrubs.
- To Messrs. Rogers, Southampton, for rock garden plants.
- To Messrs. Waterer, Twyford, for rock garden plants.
- To Mr. G. E. Welch, Cambridge, for rock garden plants.
- To Mr. W. Wells, jun., Merstham, for rock garden plants.

Award of Merit.

To *Prunus* 'Asor' (votes 9 for), from Collingwood Ingram, Esq., Benenden, Kent.

Preliminary Commendation.

To *Prunus subhirtella pendula* 'Totsuka,' as a hardy flowering tree (votes unanimous), from Miss A. R. Baring, Chandlersford.

Other Exhibits.

- Miss C. Beck, Ware: *Fritillaria Olivieri*.
- Mr. S. Boothman, Maidenhead: rock garden plants.
- Messrs. Burkwood & Skipwith, Kingston: flowering shrubs.
- Mr. A. Corderoy, Eltham: rock garden plants.
- Messrs. Clarence Elliott, Stevenage: *Pasithea coerulea*.
- Messrs. Garways, London, W.: succulents.
- Mrs. S. Goddard, Cadgwith: double green Primrose.
- Lt.-Col. Grey, Cranbrook: *Anemone Pulsatilla*, Budapest form.
- Miss Hopkins, Coulsdon: rock garden plants.
- Collingwood Ingram, Esq., Benenden: *Prunus dasycarpa*.
- Messrs. Maxwell & Beale, Broadstone: rock garden plants.
- The Hon. Mrs. Sebag-Montefiore, Plymouth: *Acacia mucronata*.
- Messrs. Redgrove & Patrick, Sevenoaks: rock garden plants.
- Messrs. Reuthe, Keston: *Agapetes buxifolia*.
- Walton Park Nurseries, Walton: rock garden plants.
- W. Whitaker, Esq., Lymington: *Prunus campanulata*.
- White House Gardens, Abergavenny: rock garden plants.
- Mr. R. Colpoys Wood, West Drayton: flowering shrubs.

ORCHID COMMITTEE.—Sir JEREMIAH COLMAN, Bart., in the Chair, and fourteen other members present.

Awards Recommended:—**Award of Merit.**

To *Cymbidium* × 'Hawfinch' var. 'Wheatley' ('Bastard' × *Alexanderi*) (votes 9 for, 4 against), from Sir William Cooke, Bart., Wyld Court, Hampstead Norris, Berks. See p. 267.

Cultural Commendation.

To Messrs. Sanders, for *Vanda* × *Charlesworthii*, a well-leaved plant bearing two spikes, with 9 and 11 flowers respectively.

Other Exhibits.

- Messrs. Charlesworth, Haywards Heath: a group of Orchids.
- Messrs. Armstrong & Brown, Tunbridge Wells: a group of Orchids.
- Messrs. Sanders, St. Albans: a group of Orchids.
- Messrs. H. G. Alexander, Tetbury: a group of Orchids.
- Messrs. Stuart Low, Jarvis Brook: a group of Orchids.
- Messrs. McBean, Cooksbridge: a group of Orchids.
- E. R. Ashton, Esq., Camden Park, Tunbridge Wells: *Ansellia nilotica*.
- Lionel de Rothschild, Esq., Exbury: *Cymbidium* × 'Adastra' and *C.* × *Balkis*.

NARCISSUS AND TULIP COMMITTEE.—Mr. E. A. BOWLES, M.A., F.L.S., F.R.E.S., V.M.H., in the Chair, and fourteen other members present.

Awards Recommended:—**Gold Medal.**

To Lord Rendlesham, Bosloe, Mawnan, Falmouth, for an exhibit of Daffodils.

XC PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

Silver-gilt Banksian Medal.

To Mr. J. L. Richardson, Prospect House, Waterford, for an exhibit of Daffodils.

Silver Flora Medal.

To Messrs. Barr, 11 King Street, Covent Garden, for an exhibit of Daffodils.

To Mr. G. H. Furness, Berrow, Somerset, for an exhibit of Daffodils.

To the Trenoweth Valley Flower Farm, St. Keverne, Cornwall, for an exhibit of Daffodils.

Silver Banksian Medal.

To Mr. R. F. Calvert, Coverack, Cornwall, for an exhibit of Daffodils.

Flora Medal.

To Messrs. D. Stewart, Ferndown, Wimborne, for an exhibit of Daffodils.

Award of Merit.

To *Narcissus* 'Diplomat' as a variety for exhibition (votes 11 for), from Mr. J. L. Richardson. See p. 268.

Other Exhibits.

Messrs. Wakeley, Bankside, London, S.E. 1 : a group of Daffodils and Tulips.

Messrs. Kelway, Langport : a group of Daffodils.

W. F. M. Copeland, Esq., 156 St. James's Road, Southampton : a seedling Daffodil obviously derived from *Narcissus cyclamineus*, although that species was three generations removed from the plant exhibited.

JOINT RHODODENDRON COMMITTEE.—Mr. J. B. STEVENSON in the Chair, and eleven other members present.

Awards Recommended :—

First-class Certificate.

To *Rhododendron* × 'Cardinal' (*R. arboreum* × *R. Barclayi*) (votes 10 for, 1 against), from Lord Aberconway, Bodnant. See p. 270.

To *R.* × 'Redwing' (*R.* × *Barclayi* × *R.* × *Shilsonii*) (votes 7 for), from Lord Aberconway. See p. 270.

Award of Merit.

To *R. commodum* (votes 11 for), from the Earl of Stair, Stranraer, Wigtownshire. See p. 270.

To *R. oreodoxa* (votes 10 for, 1 against), from Lionel de Rothschild, Esq., Exbury House, Southampton. See p. 270.

To *R. stenaulum* (votes 7 for, 1 against), from the Earl of Stair and Lionel de Rothschild, Esq. See p. 270.

Other Exhibits.

Lord Aberconway : *R.* × 'Ethel' (*R.* × 'F. C. Puddle' × *R. repens*).

Messrs. R. Gill, The Nurseries, Penryn, Cornwall : *R.* × 'Coronation' (*R. arboreum* × *R. barbatum*).

The Earl of Stair : *R. hemidartum*.

JOINT ROCK GARDEN PLANT COMMITTEE.—Dr. F. STOKER, F.L.S., in the Chair, and seven other members present.

Awards Recommended :—

Award of Merit.

To *Primula* 'Ethel Barker,' as a hardy plant for the rock garden or alpine house (votes unanimous), from F. Barker, Esq., "Onosma," Stevenage, Herts. See p. 269.

To *Primula* × *Forsteri* as a hardy rock garden or alpine house plant (votes unanimous), from G. H. Berry, Esq., "The Highlands," Ridgeway, Enfield, Middlesex. See p. 269.

Other Exhibits.

Mrs. G. Anley, Woking : *Primula Edgeworthii*.

N. G. Baguley, Esq., Banstead : *Primula glaucescens*.

Mrs. C. B. Saunders, Farnborough, Kent : *Primula* × *pubescens*.

APRIL 15-16, 1937.

DAFFODIL SHOW.

Chief Awards in the Competitive Classes.

Gold P. D. Williams Medal for the best exhibit of six varieties of Daffodils with red or orange colouring in the cup, Division II and/or Division III, three stems of each.

To Mr. J. L. Richardson, Prospect House, Waterford.

The Engleheart Challenge Cup and a Silver-gilt Flora Medal, for twelve varieties of Daffodils raised by the exhibitor.

To Mr. J. L. Richardson.

Silver-gilt Banksian Medal, for twelve varieties of Daffodils not in commerce.

To Mr. J. L. Richardson.

The Banksian Medal offered for the best bloom shown in the competitive classes was awarded to Mr. J. L. Richardson, for a bloom of *Narcissus* 'Royal Ransom.'

EARLY MARKET PRODUCE SHOW.

Chief Awards in the Competitive Classes.

Silver Cup for the most successful competitor.

To Mr. A. W. Secrett, Ham, Surrey.

Silver Knightian Medal to the competitor gaining the highest number of prize-points for salad vegetables.

To Captain R. G. M. Wilson, Surfleet, Spalding.

Knightian Medal to the competitor gaining the second highest number of prize-points for salad vegetables.

To Mr. A. W. Secrett, Ham, Surrey.

Silver Knightian Medal to the competitor gaining the highest number of prize-points for forced vegetables.

To Mr. A. W. Secrett, Ham, Surrey } Equal first.

To Mr. J. Harnett, Hoddesdon

Silver Knightian Medal to the competitor gaining the highest number of prize-points for outdoor-grown vegetables.

To Mr. A. W. Secrett, Ham, Surrey.

Knightian Medal to the competitor gaining the second highest number of prize-points for outdoor-grown vegetables.

To Mr. J. J. Barker, Southfleet.

Silver Banksian Medal to the competitor gaining the highest number of prize-points for flowers.

To Messrs. C. Engelmann, Saffron Walden

To Captain R. G. M. Wilson, Surfleet, Spalding } Equal first.

To Mr. Cecil Robinson, Spalding

Awards made to non-competitive exhibits.

The central feature of the Show was a co-operative display of vegetables and flowers for which the Schedule Committee was responsible.

Gold Medal.

To the National Farmers' Union, Surrey Branch, for an exhibit of a collection of vegetables and flowers packed for market.

Silver-gilt Knightian Medal.

To Mr. A. W. Secrett for an exhibit of a collection of vegetables packed for market.

To the Buckinghamshire Growers for an exhibit of vegetables, flowers and fruit packed for market.

To Messrs. Sutton, Reading, for an exhibit of a collection of vegetables.

Silver-gilt Banksian Medal.

To Messrs. J. T. White, Spalding, for an exhibit of Daffodils in market boxes.

Silver Knightian Medal.

To Mr. A. R. Wills, Romsey, Hants, for an exhibit of a collection of vegetables and Hydrangeas.

To Vale of Evesham Growers for an exhibit of a collection of vegetables and flowers packed for market.

Silver Flora Medal.

To Mr. Douglas Foxwell, Balcombe, Sussex, for an exhibit of Sweet Peas.

Silver Banksian Medal.

To Mr. J. Harnett, Hoddesdon, Herts, for an exhibit of Hydrangeas.

Knightian Medal.

To Captain R. G. M. Wilson, Surfleet, Spalding, for an exhibit of a collection of vegetables packed for market and Strawberries in pots.

To Mr. Cecil Robinson, Quadring, Spalding, for an exhibit of a collection of vegetables and flowers packed for market.

To Mr. C. H. Sansom, Rickmansworth, Herts, for an exhibit of Watercress.

A lecture was given by Dr. G. E. FRIEND, on "Vegetables as an article of Diet."

Chairman, Sir LIONEL EARLE, G.C.V.O., K.C.B., C.M.G.

FRUIT AND VEGETABLE COMMITTEE.—Mr. W. H. DIVERS, V.M.H., in the Chair, and fourteen other members present.

Awards Recommended :—

See p. lxxxviii.

Selected for trial at Wisley.

Seedling Rhubarb A, and seedling Rhubarb B, sent by Mr. F. Streeter, Petworth Park Gardens, Petworth.

Other Exhibits.

Co-operative Exhibit: collection of vegetables, flowers and fruit, packed for market.

Messrs. Toogood, Southampton: collection of vegetables.

The Greatford Garden Company, Stamford, Lincs: exhibit of Watercress.

DAFFODIL SHOW.

NARCISSUS AND TULIP COMMITTEE.—Mr. E. A. BOWLES, M.A., F.L.S., F.R.E.S., V.M.H., in the Chair, and twenty-one other members present.

Awards Recommended :—

Gold Medal.

To Messrs. Barr, 11 King Street, Covent Garden, for an exhibit of Daffodils.

To Mr. J. L. Richardson, Prospect House, Waterford, for an exhibit of Daffodils.

Silver-gilt Flora Medal.

To Messrs. R. H. Bath, Wisbech, for an exhibit of Daffodils.

To the Donard Nursery Company, Newcastle, Co. Down, for an exhibit of Daffodils.

To Mr. G. H. Furness, Berrow, Somerset, for an exhibit of Daffodils.

To Mr. Guy L. Wilson, Broughshane, Co. Antrim, for an exhibit of Daffodils.

Silver-gilt Banksian Medal.

To Messrs. The Trenoweth Valley Flower Farm, St. Keverne, Cornwall, for an exhibit of Daffodils.

To Messrs. A. C. van der Schoot, Hillegom, for an exhibit of Daffodils.

Silver Flora Medal.

To Mr. R. F. Calvert, Carnsulan, Coverack, for an exhibit of Daffodils.

To Messrs. Dobbie, Edinburgh, for an exhibit of Daffodils.

To Messrs. D. Stewart, Ferndown Nurseries, nr. Wimborne, for an exhibit of Daffodils.

To Messrs. Wakeley, Bankside, S.E. 1, for an exhibit of Daffodils.

Silver Banksian Medal.

To Messrs. Walter Blom, Coombelands Nurseries, Addlestone, for an exhibit of Daffodils.

To Messrs. Daniels Bros., Norwich, for an exhibit of Daffodils.

To Mr. Peter Lower, Presteigne, Manland Avenue, Harpenden, for an exhibit of Daffodils.

To Messrs. H. Prins, Duke Street, Wisbech, for an exhibit of Daffodils.

Flora Medal.

To Messrs. G. Lubbe, Oegstgeest, for an exhibit of Daffodils.

To Mr. A. K. Watson, Dyke End, Upton, Acle, for an exhibit of Daffodils.

To Messrs. The Welsh Bulb Fields, St. Asaph, for an exhibit of Daffodils.

Banksian Medal.

To Messrs. Cuthbert, Caldecot House, Goff's Oak, for an exhibit of Daffodils.

To Mr. H. G. Longford, Manor Farm, Marcham, Abingdon, for an exhibit of Daffodils.

Award of Merit.

To *Narcissus* 'Candour' as a variety for exhibition (votes unanimous). Raised and shown by Mr. Guy L. Wilson. See p. 268.

To *Narcissus* 'Daytona' as a variety for exhibition (votes 12 for, 5 against). Raised and shown by Mr. J. L. Richardson. See p. 268.

To *Narcissus* 'Polindra' as a variety for exhibition (votes unanimous). Raised by Mr. P. D. Williams and shown by Mr. J. L. Richardson. See p. 269.

Varieties selected for trial.

Narcissus 'Corinthian,' shown by Messrs. Seymour Coble, Spalding, was selected for trial at Kirtton as a variety for cutting from the open for market.

Narcissus 'Owl,' shown by Mr. W. F. M. Copeland, 156 St. James's Road, Southampton, was selected for trial at Wisley as a variety for garden decoration.

Narcissus 'Joy Bells,' shown by Mr. W. F. M. Copeland, was selected for trial at Wisley as a variety for garden decoration.

Other Exhibits.

Earl of Darnley, Cobham Hall, Kent: *Narcissus* 'Ice Curtain,' which the Committee desired to see again when more blooms were available.

Miss Tiddeman, The Brick House, Great Warley: *Narcissus* 'Great Warley.'
The Peter Barr Memorial Cup.

It was recommended that the Peter Barr Memorial Cup, which is awarded annually to someone who has done good work on behalf of the Daffodil, be awarded to Mr. H. J. Poole, Waterloo Road, Lower Hutt, New Zealand.

APRIL 20, 1937.

Mr. W. E. TH. INGWERSEN in the Chair.

A lecture was given by Mr. H. F. R. MILLER, on "Sempervivums."

SCIENTIFIC COMMITTEE.—Mr. E. A. BOWLES, M.A., F.L.S., F.R.E.S., V.M.H., in the Chair, and nine other members present.

Colour and chlorosis in Hydrangea.—Mr. Milton Hutchings showed a number of plants of *Hydrangea* to illustrate the range of colour and amount of chlorosis he had found in endeavouring to obtain pink-flowered plants of good size and habit. His soil contained little lime, and he had endeavoured to bring the reaction to the correct point by the addition of calcium carbonate. In many instances a chlorotic condition had resulted, but in some the youngest leaves were now growing a healthy green and only the older ones were chlorotic, as though the excess of calcium had been immobilized or removed by watering. Dr. Tincker had examined the reaction of the soil in the best plant and had found it 6.75 pH. He thought the critical point might be about 6.5 pH. The difficulty of thoroughly mixing the added calcium carbonate throughout the bulk of soil was pointed out.

Citrus Bizarria.—Miss Campbell of Layer Marney, Essex, showed a number of fruits of this curious *Citrus* which has at times fruits resembling oranges, at times lemon-like fruits, at times fruits partaking of the appearance of both oranges and lemons in patches. It has been known since the seventeenth century, and is by some regarded as a graft hybrid, by others as a continually sporting cross-bred.

Narcissus Pseudo-Narcissus × *N. Bulbocodium.*—The Director of Wisley sent flowers of a chance hybrid between the Hoop-Petticoat and the Trumpet *Narcissus*. It had been growing at Wisley for several years and had increased. The flowers had a small perianth little more than half the length of the straight yellow trumpet, and the conical tube was much longer than is usual in the varieties of *Narcissus Pseudo-Narcissus*.

A Botanical Certificate was unanimously recommended, and the name "Wisley hybrid" was attached.

FRUIT AND VEGETABLE COMMITTEE.—Mr. E. A. BUNYARD, F.L.S., in the Chair, and ten other members present.

Exhibits.

R.H.S. Commercial Fruit Trials, Wisley: Apple 'Woolbrook Russet.'

FLORAL COMMITTEE A.—Mr. J. M. BRIDGEFORD in the Chair, and seventeen other members present.

*Awards Recommended:—**Silver-gilt Banksian Medal.*

To Messrs. Allwood, Haywards Heath, for Carnations.

To Messrs. Blackmore & Langdon, Bath, for *Schizanthus*.

Silver Flora Medal.

To Messrs. Blackmore & Langdon, Bath, for Polyanthus.

To Messrs. Chaplin, Waltham Cross, for Roses.

To Messrs. Sutton, Reading, for Polyanthus.

Silver Banksian Medal.

- To Ashington Nurseries, Ltd., Ashington, for Carnations.
- To Mr. G. H. Dalrymple, Bartley, for Auriculas and Primulas.
- To Mr. J. Douglas, Great Bookham, for Auriculas.
- To Messrs. Engelmann, Saffron Walden, for Carnations, Antirrhinums and Pansies.

Flora Medal.

- To Army Vocational Training Centre, Chisleton, for greenhouse plants.
- To Messrs. F. Cant, Colchester, for Roses.
- To Messrs. Low, Enfield, for Carnations.

Banksian Medal.

- To Messrs. Kelway, Langport, for Tree Paeonies.
- To Mr. H. G. Longford, Abingdon, for Polyanthus.
- To The Dean Gardens, Longniddry, for Primroses and Polyanthus.
- To Messrs. Wall, Bath, for Aquilegias.

Cultural Commendation.

- To Mr. W. T. Gee, gardener to N. S. Holland, Esq., Cowden, for *Cineraria stellata*.

Other Exhibits.

- Messrs. Bedford & Page, Cambridge: Polyanthus.
- Messrs. Clark, Dover: Irises and Primroses.

FLORAL COMMITTEE B.—Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and seventeen other members present.

Awards Recommended :—

Silver Flora Medal.

- To Messrs. Waterer, Bagshot, for Japanese Cherries and other shrubs.

Silver Banksian Medal.

- To Messrs. Hillier, Winchester, for Japanese Cherries and other shrubs.
- To Messrs. Hillier, Winchester, for rock garden shrubs.
- To Hocker Edge Gardens, Cranbrook, for bulbous and rock garden plants.
- To Messrs. Stuart Low, Enfield, for Camellias and other shrubs.
- To Mr. W. J. Marchant, Wimborne, for rock garden shrubs.

Flora Medal.

- To Messrs. Barr, Taplow, for Primulas, Narcissi and Tulips.
- To Messrs. Bedford & Page, Cambridge, for rock garden plants.
- To Brookside Nurseries, Oxford, for rock garden plants.
- To Mr. A. W. Constable, Southborough, for Lilies and other bulbous plants.
- To Messrs. Ingwersen, East Grinstead, for rock garden plants.
- To Mr. E. Ladhams, Elstead, for rock garden plants.
- To Messrs. Prichard, Christchurch, for rock garden plants.
- To Messrs. Reuthe, Keston, for rock garden plants.
- To Messrs. Russell, Windlesham, for flowering shrubs.
- To Messrs. Waterer, Twyford, for rock garden plants.
- To Mr. G. E. Welch, Cambridge, for rock garden plants.

Banksian Medal.

- To Alpine Nurseries, West Moors, for rock garden plants.
- To Messrs. Burkwood & Skipwith, Kingston, for flowering shrubs.
- To Mr. A. Corderoy, Eltham, for rock garden plants.
- To Messrs. Elliott, Stevenage, for rock garden plants.
- To Mr. L. Lawrence, Taplow, for succulents.
- To Messrs. Rogers, Southampton, for rock garden plants.
- To Mr. W. Wells, jun., Merstham, for rock garden plants.

Award of Merit.

To *Anomalesia Cunonia* as a flowering plant for the cool house (votes 9 for), from T. T. Barnard, Esq., Wareham. See p. 267.

To *Erica Pageana* as a flowering shrub for the cool house (votes 10 for), from Mrs. G. Anley, Woking, and Mrs. Dyson Perrins, Malvern. See p. 268.

To *Ixia paniculata* as a flowering plant for the cool house (votes 11 for), from Lord Aberconway, Bodnant. See p. 268.

To *Prunus Persica* 'Cambridge Carmine' as a hardy flowering tree (votes 9 for), from F. G. Preston, Esq., University Botanic Garden, Cambridge. See p. 269.

Other Exhibits.

- Lord Aberconway, Bodnant : *Sophora macrocarpa*, *Habenaria* sp.
 Messrs. Allwood, Haywards Heath : *Dianthus* for rock garden.
 Alpine Nurseries, West Moors : *Ledum nipponicum*.
 Mrs. G. Anley, Woking : *Ledum nipponicum*.
 Mrs. Hiatt Baker, Almondsbury : *Clematis Armandii*, *Berberis congestiflora* var. *hakeoides*.
 Mr. H. S. Bootham, Maidenhead : rock garden plants.
 Chez Nous Nurseries, Newick : rock garden plants.
 Mr. Wm. Christy, Chichester : *Rosmarinus officinalis* white variety.
 Mark Fenwick, Esq., Stow-on-the-Wold : *Erica carnea*.
 Dame Alice Godman, Horsham : *Ornithogalum* sp., *Ophrys aranifera* var., *Ranunculus millefoliatus*.
 Messrs. Hillier, Winchester : *Prunus incisa* × *sachalinensis*.
 Miss Hopkins, Coulsdon : rock garden plants.
 Collingwood Ingram, Esq., Benenden : *Prunus serrulata* 'Taoyome.'
 Mr. J. Klinkert, Richmond : clipped Box trees.
 Marsden Nurseries, Ashted : rock garden plants.
 Messrs. Maxwell & Beale, Broadstone : rock garden plants.
 Mrs. H. Milford, Chedworth : rock garden plants.
 Orchard Neville Nurseries, Glastonbury : rock garden plants.
 Owermoigne Nurseries, Dorchester : rock garden plants.
 Messrs. Redgrove & Patrick, Sevenoaks : rock garden plants.
 Mr. J. Robinson, Eltham : rock garden plants.
 Sandon Nurseries, Chelmsford : rock garden plants.
 The Rt. Hon. Lord Swaythling, Southampton : *Erica australis* var.
 Mrs. Torkington, Maidenhead : *Anemone Pulsatilla* double-flowered.
 Walton Park Nurseries, Walton : rock garden plants.
 White House Gardens, Abergavenny : rock garden plants.
 Mr. G. G. Whitelegg, Chislehurst : rock garden plants.
 Mr. R. Colpoys Wood, West Drayton : rock garden plants and shrubs.

ORCHID COMMITTEE.—Sir JEREMIAH COLMAN, Bt., in the Chair, and fourteen other members present.

Awards Recommended :—

Silver Banksian Medal.

To Messrs. Charlesworth, Haywards Heath, for *Odontoglossums*.

Award of Merit.

To *Cymbidium* × 'Dorchester' var. 'Saleden' (*Alexanderi* × 'Tityus') (votes unanimous), from Miss Walkden, The Raft, Sale, Cheshire. See p. 267.

To *Cymbidium* × 'Adastra' ('Letty' × *Pauwelsii*) (votes 11 for, 1 against), from Lionel de Rothschild, Esq., Exbury. See p. 267.

To *Odontoglossum crispum* var. 'Supreme' (votes 10 for, 4 against), from Messrs. Charlesworth, Haywards Heath. See p. 269.

Cultural Commendation.

To Mr. W. Crossingham, gr. to W. F. Higgins, Esq., 28 Northampton Road, Croydon, for *Leptotes bicolor*, bearing 16 flowers.

To Miss Walkden, The Raft, Sale, Cheshire, for *Cymbidium* × 'Dorchester' var. 'Leraft,' a robust plant with three many-flowered spikes.

Other Exhibits.

Messrs. Armstrong & Brown, Tunbridge Wells : a group of Orchids.

Messrs. Stuart Low, Jarvis Brook : *Odontoglossum* hybrids.

Messrs. H. G. Alexander, Tetbury : a group of Orchids.

NARCISSUS AND TULIP COMMITTEE.—Mr. W. A. BOWLES, M.A., F.L.S., F.R.E.S., V.M.H., in the Chair, and eight other members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Mr. J. L. Richardson, Prospect House, Waterford, for an exhibit of Daffodils.

Silver Flora Medal.

To Messrs. Barr, 12 King Street, Covent Garden, W.C. 2, for an exhibit of Daffodils.

To Messrs. R. H. Bath, Wisbech, for an exhibit of Daffodils.

xcvi PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

Silver Banksian Medal.

To Messrs. D. Stewart, Ferndown Nurseries, nr. Wimborne, for an exhibit of Daffodils and Tulips.

To Mr. A. K. Watson, Dyke End, Upton, Acle, for an exhibit of Daffodils.

Flora Medal.

To Messrs. Wakeley, Bankside, S.E. 1, for an exhibit of Daffodils.

Banksian Medal.

To Messrs. Dobbie, Edinburgh, for an exhibit of Daffodils.

To Messrs. Daniels, Norwich, for an exhibit of Daffodils.

Selected for trial.

Narcissus 'Mrs. William Copeland,' shown by W. F. M. Copeland, Esq., West View, 156 St. James's Road, Southampton, was selected for trial at Wisley as a variety for garden decoration.

Other Exhibits.

Earl of Darnley, Cobham Hall, Kent: *Narcissus* 'Lydia,' to be seen again when more blooms are available.

W. F. M. Copeland, Esq.: *Narcissus* 'Her Ladyship.'

The Director of the R.H.S. Gardens: a chance hybrid which had occurred at Wisley between *Narcissus Pseudo-Narcissus* and *N. Bulbocodium*. See p. xciii.

JOINT IRIS COMMITTEE.—Mr. D. B. CRANE in the Chair, and five other members present.

Exhibit.

Iris japonica var., shown by Lord Aberconway, Bodnant, N. Wales. A fine form, with tall many-flowered stems.

JOINT RHODODENDRON COMMITTEE.—Mr. E. H. WILDING in the Chair, and ten other members present.

Awards Recommended:—

First-class Certificate.

To *Rhododendron Elliottii* (K.W. 7725) (votes 9 for), from Admiral Walker-Heneage-Vivian, Clyne Castle, Blackpill, Swansea. See p. 270.

Award of Merit.

To *R.* × 'White Glory' (*R. irroratum* × *R.* × *Loderi*) (votes 6 for), from Lady Loder, Leonardslee, Horsham. See p. 271.

Preliminary Commendation.

To *R.* × 'Bluebird' (*R. Augustinii* × *R. intricatum*) (votes 8 for), from Lord Aberconway, Bodnant, N. Wales. See p. 269.

Other Exhibits.

Mrs. Gerndolyn Anley, St. George's, Woking: *R. chrysanthum* (to be seen again).

Lady Loder: *R.* × 'Surprise' (*R. Falconeri* × *R. Thomsonii*).

Admiral Walker-Heneage-Vivian: *R.* × 'Griedal' (*R. Dalhousiae* × *R. Griersonianum*).

Lord Aberconway: *R.* × 'Sir Charles Lemon,' *R. campanulatum* (W 1863, Chinese form), and *R. arboreum* 'Bodnant Pink.'

N. S. Holland, Esq., Saxby's, Cowden, Kent: *R.* × 'Racil' (*R. racemosum* × *R. ciliatum*).

JOINT ROCK GARDEN PLANT COMMITTEE.—Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and eight other members present.

Awards Recommended:—

Award of Merit.

To *Androsace Halleri* as a rock garden or alpine house plant (votes 6 for), from Dr. P. L. Giuseppi, Felixstowe. See p. 267.

To *Cassiope lycopodioides* as a hardy rock garden or alpine house plant (votes 6 for), from Dr. Giuseppi. See p. 267.

To *Cassiope Stelleriana* as a hardy rock garden plant (votes unanimous), from A. N. Griffith, Esq., Paradise House, Newnham, Cambridge. See p. 267.

To *Epimedium grandiflorum* var. 'Rose Queen' as a hardy flowering rock plant (votes 6 for), from Miss D. C. Hopton, Hagley Court, Bartestree, Hereford. See p. 268.

To *Jeffersonia dubia* as a hardy rock garden or alpine house plant (votes 6 for), from G. P. Baker, Esq., Hillside, Kippington, Sevenoaks. See p. 268.

To *Ranzenia japonica* as a plant for the alpine house (votes unanimous), from Miss D. C. Hopton, Hagley Court, Hereford. See p. 269.

To *Sanguinaria canadensis flore pleno* as a hardy flowering rock plant (votes unanimous), from Dr. Giuseppi. See p. 271.

To *Viola Grisebachiana* as a hardy rock garden or alpine house plant (votes unanimous), from Dr. N. W. Jenkin, Trimmersfield, Hindhead. See p. 271.

To *Viola Hersogii* as a hardy flowering rock garden or alpine house plant (votes 5 for, 2 against), from Mrs. H. P. Thompson, High Pine Close, Weybridge. See p. 271.

Cultural Commendation.

To Mr. Payne, gardener to Dr. Giuseppi, Felixstowe, for an exceptionally large flowering specimen of *Cassiope lycopodioides*.

To Mr. K. S. West, gardener to Dr. N. W. Jenkin, Trimmersfield, Hindhead, for an example of the rare *Viola Grisebachiana* in full bloom.

Other Exhibits.

Alpine Nurseries, West Moors: *Anemone nemorosa* var., *Lithospermum diffusum erectum*.

G. P. Baker, Esq., Sevenoaks: *Draba polytricha* (E.K.B. 351), *Fritillaria latifolia*, *F. obliqua*, *Primula Dubernardiana*.

Mrs. J. Hally Brown, Skelmorlie: *Zaluzianskya roselioides*.

Lady Cripps, Lechlade: *Sedum praealtum*.

E. D. Doncaster, Burley: *Fritillaria Drenowskii*.

Dr. Giuseppi, Felixstowe: *Androsace carinata*, *Epimedium grandiflorum*, *Schizocodon ilicifolius albus*, *Vaccinium Nummularia*.

A. N. Griffith, Esq., Newnham, Cambridge: *Primula hisoana*, *Primula Matsumurai*, *Saxifraga Federici-Augustii*.

Miss D. C. Hopton, Hagley Court, Hereford: *Androsace sarmentosa*, *Aethionema oppositifolium*, *Myosotis uniflora*.

M. S. McLaren, Esq., Burford: *Mertensia primuloides*, *M. tibetica*.

Mrs. Maitland-Kirwan, Castle Douglas: *Primula pubescens* 'Shieling.'

Mrs. Milford, Chedworth: *Aster* sp. 641, *Crassula curta*?

Mrs. W. Milner, Sheffield: *Primula marginata* 'Peakland Violet.'

Mrs. C. B. Saunders, Farnborough, Kent: *Anacyclus atlanticus vestitus*. *Primula viscosa*, dark form.

Dr. J. E. Saville, Whitstable: double yellow *Polyanthus*.

Miss E. M. Savory, Olney: *Primula marginata* 'Linda Pope,' *Ranunculus amplexicaulis*.

Dr. R. Seligman, Wimbledon, S.W. 19: *Fritillaria oranensis*, *Saxifraga maderensis*.

DONATIONS TO THE SOCIETY'S GARDENS AT WISLEY, 1936 (cont.).

GENEVA BOTANIC GARDEN, Switzerland; collection of plants. GHOSH, Messrs. G., Darjeeling, India; collection of seeds. GIBSON, Messrs. (Cranleigh); collection of Border Carnations. GIUSEPPI, Dr., Felixstowe, Suffolk; plants of *Campanula* and *Weldenia*. GIZA, HORTICULTURAL SECTION, Ministry of Agriculture, Egypt; seeds of *Salvia* and *Oenothera*; roots of *Iris Helenae*. GLASGOW BOTANIC GARDEN; collection of seeds. GLASNEVIN BOTANIC GARDEN, Dublin; plant of *Conandron ramondoides* var. *alba*; collection of seeds. GLENNY, G., Surfleet, Spalding; plants of Strawberries 'Fred Glenn' and 'George Glenn'. GORDON-ALEXANDER, Major L. D., Normandy, Guildford; seeds of Namaqualand Daisy. GÖTEBORG BOTANIC GARDEN, Sweden; collection of seeds. GÖTTINGEN, UNIVERSITY BOTANIC GARDEN, Germany; collection of seeds. GOULD, G. W., Nottingham; seeds of *Androsace* species and *Gentiana*. GOULD, N. K., West Byfleet, Surrey; seeds of *Lilium candidum*, *Salonika* var. GRONINGEN BOTANIC GARDEN, Holland; seeds of *Nyssa sylvatica* and *Symplocos japonica*. HAMBURG BOTANIC GARDEN, Germany; seeds of *Acer saccharum*. HANBURY, C., La Mortola, Ventimiglia, collection of seeds. HANBURY, F. J., East Grinstead, Sussex; collections of plants and cuttings. HANGER, F., Exbury, Southampton; seeds of *Skimmia* and *Sambucus*. HARLEY, A., Blinkbonny, Kirkcaldy, N.B.; seeds of *Meconopsis*, *Gentiana*, and *Nomocharis*; plants of *Gentiana* 'Devonhall' and *G. ornata*. HAWKER, H. G., Strode, Ermington, Devon; bulbs of *Iris reticulata* 'Cantab'; plant of *Cassia corymbosa*. HAWTHORN, W. H., West Byfleet, Surrey; books for the Library. HAYASHI, Count H., Shibuyaku, Tokyo; collection of seeds of Manchurian and other plants. HIBBERD, H., Burnham Thorpe, Norfolk; seeds of red-berried Mistletoe, etc. HERKLOTS, G. A. C., Biology Dept. of University, Hong Kong; collection of seeds. HILLING, Messrs. T., Chobham, Surrey; seeds of *Primula japonica* 'Miller's Scarlet'; plants of *Styrax japonicus*; collection of Roses. HILLIER, Messrs., Winchester; plant of *Ceanothus dentatus* var. *impressus*; of *Viburnum erubescens*. HITCHING, Miss B. M., University College of N. Wales, Bangor; tubers of six species of *Oxalis*. HOCKER EDGE GARDENS, Cranbrook, Kent; collection of *Oncocylus* Irises; of unnamed bulbous plants. HOKKAIDO IMPERIAL UNIVERSITY BOTANIC GARDEN, Sapporo, Japan; collection of seeds; Ditto (DEPT. OF BOTANY); collection of seeds. HOLMES, J., Concord, Mass., U.S.A.; seeds of *Buddleia Davidi* var. *magnifica*; cuttings of *Verbena* species. HORNE, MURRAY, Hereford; seeds of *Arctotis*; of *Arctotis* x *Venidium*. HORSFALL, R. E., Seale, Farnham, Surrey; plant of *Rhododendron* 'Primrose Queen'. HURST, Dr., Forest Seed Separating Station, Kamloops, B.C.; seeds of *Abies amabilis*. HUTCHINSON, H. M., Banstead, Surrey; plant of hybrid dwarf *Salix*. HUTCHINSON, W., Finchampstead, Berks; seeds of *Liliums*. HUTTON, Mrs., Great Witley, Worcester; roots of *Campanula* species. INGLBY, Hon. Lady, Knaresborough, Yorks; plant of *Pelargonium* 'Ripley Castle'. INGLIS, Mrs., Hollywood, Co. Down; plants of Raspberry 'Dreadnought'. INGRAM, COLLINGWOOD, Benenden, Kent; plants of *Meconopsis*, *Clematis*, *Oxalis*, *Delphinium*, and *Rhododendron*; fruits of *Viburnum dilatatum* var. *xanthocarpum*. INGWERSEN, W. E. TH., Sharpthorne, East Grinstead; collections of plants for Rock Garden; seeds of *Rumex*, *Cyclamen*, and *Pyranthrum*; collection of seeds from Rocky Mts. Expedition. INMAN, H. R., Hampstead, N.W.; bulbs of 'Aden Lilies'. INNES, JOHN, HORTICULTURAL INSTITUTION, Merton, S.W. 19; grafts of Plums and Cherries, and trees of Plums of Russian origin; grafts of Apples, Cherries, and Pears, and trees of Plums from Jugo-Slavia. IVEAGH, Earl of, Pyrford Court, Woking; cuttings of *Lonicera japonica* var. *Halliana*. JENKIN, Dr., Hindhead; collection of plants for rock garden. JENKINSON, R. C. H., Knaphill, Woking; plant of *Pentapterygium sikkimensis*. JERVOISE, Lady CLARKE, Newbury; books for the Library. JOHNSTONE, G. H., Grampound Road, Cornwall; grafts of hybrid *Rhododendrons* and *Cladrastis*; fruit of *Magnolia*. JONAS, A. C., Fordingbridge, Hants; seeds of *Pasania lutea*. JONES, G. H., Leighton Buzzard; plants of *Campanula Allionii* 'Frank Barker'. KERR, A. C. B., New Haw, Weybridge; plants of Rose 'Karen Poulsen'; cornlets of *Gladiolus Saundersii*. KERR, A., Hayes, Kent; seeds of *Lilium* from N. Siam. KERR, Mrs., Esher; bulbs for identification. KEW ROYAL BOTANIC GARDENS; collections of seeds, plants and cuttings. KNAPTON, H. A., Orpington, Kent; plants of Border Carnation 'W. B. Cranfield'. KNIGHT, A., W. Clandon, Surrey;

DONATIONS TO THE SOCIETY'S GARDENS AT WISLEY, 1936. xcix

seeds of *Mina lobata*. KÖLN-AM-RHEIN BOTANIC GARDEN, Germany; collection of seeds. KORNIK GARDENS AND ARBORETUM, Poland; collection of tree and shrub seeds. LAING, Mrs. J., Hawick, N.B.; plant of Primrose 'Kenneth Laing.' LAMB, F., East Grinstead, Sussex; tuber of Dahlia 'June F. Lamb.' LANKESTER, C. H., Costa Rica; seeds of *Werchlea lutea*. LAURENCE, Miss, Millbrook, S.W.; plant of *Lisianthus frigidus* from Guadelupe. LAUSANNE UNIVERSITY BOTANIC GARDEN, Switzerland; collection of seeds. LAWRENCE, Lady, Riverdale, Dorking; plant of *Iris tectorum* var. *alba*. LEMPERG, Dr. F., Steiermark, Austria; collections of seeds and plants for rock garden. LENINGRAD BOTANIC GARDEN, U.S.S.R.; collection of seeds. LESCHALLAS, Capt., Prestbury, Glos.; seeds of *Abronia fragrans*; collection of plants for rock garden. LEWIS, J., Greenville, Michigan, U.S.A.; seeds of *Gentiana crinita*. LEXINGTON BOTANIC GARDEN, Mass., U.S.A.; collection of seeds. LEYDEN BOTANIC GARDEN, Holland; collection of seeds. LITTLE, N. E., St. Cross, Winchester; root of hybrid tall bearded Iris. LOCKE-KING, Dame ETHEL, Brooklands, Weybridge; plant of *Buddleia Colvilei*. LOPTHOUSE, T. A., Middlesbrough; plants of *Hepatica*; cuttings of *Satureia*; collection of seeds. LONG, F. R., Port Elizabeth, S. Africa; collection of seeds. LOW, Messrs. STUART, Enfield, Mddx.; plants of three varieties of *Camellia japonica*. LOWNDES, G. R., Ringwood, Hants; seeds of *Lilium* and *Primula* species. LUBBOCK, Mrs., Windlesham, Surrey; cuttings of *Lonicera tragophylla* and of varieties of *Camellia japonica*. LUGARD, E. G., Furizen Wood, Dorking; books for the Library. LUKIN, Mrs. R., Burghfield Common, Berks; plants of *Anacyclus*, *Odontospermum*, and *Scilla*. LUND BOTANIC GARDEN, Sweden; collection of seeds. LU-SHAN ARBORETUM, Kiukiang, China; collections of seeds of trees and shrubs. LYON BOTANIC GARDEN, France; collection of seeds. LYTEL, Rev. Prof., Chilworth, Southampton; collection of seeds. MACAULAY, R. H., Kilmichael Glassary, Argyll; plants of hybrid Gentians. McCASKIE, W., Bicton, Devon; collection of tree and shrub cuttings. McCONNELL, Mrs. T., Belvoir Park, Belfast; seeds of *Primula* species; cuttings of Escallonia 'Donard Brilliance.' MACINTYRE, Miss M., Wisley; books for the Library. MADRID BOTANIC GARDEN, Spain; collection of seeds. MAGOR, E. J. P., St. Tudy, Cornwall; seedlings of *Rhododendron* species, of *Adenophora* and *Gentiana*. MAITLAND, Mrs. CRICHTON, Bourne, Lincs.; fruits of *Euonymus phellomanus*. MARCHANT, W. J., Stapehill, Wimborne, Dorset; collections of Ericaceous and other shrubs; cuttings of *Gaultheria* and *Gaylussacia* species; seeds of *Viburnum Opulus* var. *xanthocarpum*. MARKHAM, E., Gravetye, East Grinstead; plants of large-flowered and other *Clematis*. MARSDEN-JONES, E. M., Potterne, Wilts.; runners of *Fragaria vesca*. MARSEILLES BOTANIC GARDEN, France; collection of seeds. MARSHALL, Miss, Ambleside, Westmorland; fruits of *Davidia involu-crata*. MARTIN, Dr. A., Hayward, California; plants of *Chimaphila*, *Goodyera*, and *Mitchella*; seeds of several varieties of Squashes; of native and other plants. MARTINEAU, Lady, Ascot; plants of herbs, and *Prunus nana* var. 'Firehill'; cuttings of various shrubs. MASTERMAN, Mrs., Ascot, Berks; seeds of blue berry from Tasmania. MAUDE, Miss S., Farnham, Surrey; seeds of *Campanula rupestris*. MILLARD, F. W., Felbridge, East Grinstead; collection of plants for Rock Garden; seeds of *Penstemon* species. MITCHELL, W. J., Westonbirt, Tetbury; *Rhododendron javanicum* hybrids; eighteen species of *Acer*. MITCHISON, —, Wootton, I.O.W.; two unnamed Leguminous plants. MODENA UNIVERSITY BOTANIC GARDEN, Italy; collection of seeds. MONRO, G., Covent Garden, W.C. 2; plant of *Euphorbia sikkimensis*. MONTEVIDEO, PUBLIC PARKS DEPT., Uruguay; collection of seeds. MONTGOMERIE, A., Northwood, Middlesex; seeds of *Cornus florida*, *Magnolia macrophylla* and *M. virginiana*. MOONEY, G. K., Sevenoaks, Kent; seeds of *Ranunculus parnassifolius*. MOORE, H. ARMYTAGH, Saintfield, Co. Down; seeds of *Meconopsis violacea* and *Primula muliensis*. MOORE, Lady, Rathfarnham, Co. Dublin; seeds of *Magnolia Cambellii* and *M. salicifolia*. MORTON ARBORETUM, Lisle, Illinois, U.S.A.; collection of tree and shrub seeds. MOSCOW UNIVERSITY BOTANIC GARDEN; collection of seeds. MULLIGAN, B. O., Wisley; seeds of *Rosa*, *Sequoia*, *Tsuga*; cuttings of *Berberis*, *Camellia*, *Cotoneaster*, and *Juniperus*; books for the Library. MULLIGAN, Mrs. K. E., Knock, Belfast; seeds of *Meconopsis*; cuttings of climbing white Rose; roots of Balm. MÜNDEN BOTANIC GARDEN, Hann, Germany; collection of tree and shrub seeds. MUNICH BOTANIC GARDEN, Germany; collection of seeds of alpine and herbaceous plants. MURRAY, Mrs., Ecclefechan, N.B.; seeds of *Echeveria* and *Kalanchoë*; plants of *Primula Bulleyana*; cuttings of *Gaultheria*. MUSGRAVE, C. T., Hascombe, Godalming; seeds, chiefly of rock garden plants; cuttings of *Tropaeolum majus* var.; bulbs of *Lilium Washingtonianum*. NANKING BOTANIC GARDEN, China; collection of seeds of trees and shrubs. NEW YORK BOTANIC GARDEN, Bronx Park, N.Y.,

C PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

U.S.A.; collection of plants of *Hemerocallis* hybrids; seeds of *Saxifraga tennessensis*; collection of shrub seeds; seeds from 1936 Rocky Mts. Expedition. NIKITA BOTANIC GARDEN, Crimea, U.S.S.R.; collection of seeds. NORTON, J. L., East London, S. Africa; seeds of *Crinum longifolium*, *Stapelia* species, *Strelitzia Reginae*. NOTCUTT, R. C., Woodbridge, Suffolk; cuttings of *Berberis*. OCCLESTON, Lt.-Col. S. V., Sandhurst, Berks; seeds from New Zealand. ODESSA BOTANIC GARDEN, U.S.S.R.; collection of seeds. ORRED, Mrs., St. George's Hill, Weybridge; seeds of golden *Catalpa*. OSAKA INTERNATIONAL GARDEN, Red Cross Hospital, Japan; seeds of *Torreya nucifera*. OSLO BOTANIC GARDEN, Norway; collection of seeds. OTTAWA CENTRAL EXPERIMENTAL FARM, Canada; collection of seeds. OVERALL, J. PTY., Sulphur Creek, Tasmania; collection of seeds. PALMER, J. F. (per F. R. DURHAM, Vincent Square); seeds of *Lilium columbianum*. PARIS, NATURAL HISTORY MUSEUM; seeds of rock plants. PENNELL, J., Kingston Hill, Surrey; collection of seeds of herbaceous plants. PERRY, AMOS, Enfield, Middlesex; seeds of Bog Orchis from W. Abyssinia. PHILLIPS, Mrs., S. Kingswear, Devon; cuttings of *Lithospermum rosmarinifolium*. PIKE, A. V., New Lodge Clinic, Windsor Forest; collection of seeds; roots of *Michauxia campanuloides*. PLATT, J. W., Chudleigh, S. Devon; plants of *Gaultheria* species; of *Mutisia speciosa*. PORTER, G. P., West Moors, Wimborne; collection of plants for rock garden. PRIESTLEY, Mrs. J. B., Highgate Village, N. 6; seeds of *Atriplex* and *Enceliopsis* from Death Valley, California. PRITCHARD, W. B., Parks Dept., Llandudno; plants of *Chrysanthemum erubescens*. RAMSBOTTOM, J., Natural History Museum, S.W. 7; collections of seeds from Bhutan. RAND, Mrs. W., Surbiton, Surrey; seeds of *Iris nepalensis*, *Primula elongata*, and *P. obtusifolia*. RIVERS, Messrs. T., Sawbridgeworth, Herts; grafts of Pears 'Knight's Monarch' and 'Parrot'. RIVOIRE, Père et Fils, Lyon, France; plants of Strawberry 'Excelsior'. ROCKLEY, Lady, Cadogan Square, S.W.; seeds from Victoria, Australia. RODGERS, J., Rostrevor, Co. Down; plants, seeds and cuttings of various shrubs. ROGERS, C. G., Etchingham, Sussex; seeds of shrubs from California. ROGERS, R. B., Launceston, Cornwall; seeds of *Meconopsis*, *Primulas*, and *Phyllostachys*; plants of *Ornithogalum* and *Primula*. ROMNEY, Earl of, Gayton Hall, Norfolk; bulbs of *Iris reticulata* and *Galanthus nivalis* fl. pl. ROSENHEIM, P., East Molesey, Surrey; seeds of *Aquilegia*, *Lilium*, and *Tulipa*. ROTHSCHILD, L. DE, Exbury, Southampton; seeds of *Acer palmatum*, *Gaultheria tetramera*, and *Rhododendron* species. RUYLS, B., Dedemsvaart, Holland; collection of herbaceous plants. ST. MARY'S SCHOOL, Wantage, Berks; plants of small-flowered Primrose. SANDEMAN, F. S., Kingennie, Angus, N.B.; seeds of *Meconopsis*, *Primulas*, and other plants. SANDERSON, Rev. F., Overseas House, S.W. 1; fruits of *Sorbus Aucuparia* var. *dulcis*. SEABROOK, W. P., Chelmsford, Essex; trees of thirteen varieties of Apples. SENIOR, R. M., Cincinnati, Ohio; seeds of *Campanula stellaris*. SHAW SMITH, D. L., Ballawley, Co. Dublin; collection of plants for rock garden. SHEARBURN, H., Munstead, Godalming; plants of *Gentiana acaulis*. SHELDON, W. G., Oxted, Surrey; corms of *Crocus* species; various rock and herbaceous plants. SHEPHERD, F. W., Dept. of Agriculture, Leeds University; plants and seeds of *Senecio Doronicum*. SKINNER, F. L., Dropmore, Manitoba; seeds of *Lobelia Kalmii* var. *alba* and *Phlox Hoodii*; bulbs of *Lilium* x *Maxwellii*; plants of *Mertensia*. SMITH, Mrs. L., Chilworth, Surrey; plants of *Tricyrtis hirta*. SMITHSON, Mrs. C., Aboyne, N.B.; plants of double yellow and double white Poppies. SOPPER, Lt.-Col. F. W., Gorthleck, Inverness; seeds of *Meconopsis* and *Primula* species. SPRINGFIELD, Mrs. A. S., Earl's Colne, Essex; seeds of Kashmir alpine plants. STARK & SON, Messrs., Fakenham, Norfolk; seeds of *Statice* 'Artistic'. STEARN, W. T., R.H.S., Vincent Square, S.W. 1; plants of *Stachys grandiflora* vars. *robusta* and *superba*. STERN, F. C., Goring-by-Sea, Sussex; cuttings of shrubs; seeds of *Acer laxiflorum* and *Paeonia cretica*; collections of various plants. STEVENSON, J. B., Tower Court, Ascot; plant of *Vaccinium* species; seeds of *Acer pennsylvanicum*; *Arundinaria Falconeri*. STOKER, Dr. F., Loughton, Essex; seeds of seven Lilies. STOKES, Lady, Ripley, Surrey; plant of *Campanula grandis*. STOUGHTON, Prof. R. H., Reading; collection of plants and shrub cuttings. STREETER, F., Petworth Park Gardens, Sussex; bulbs of *Amaryllis Belladonna*, *Glasnevin* variety. SUTTON & SONS, Messrs., Reading; collections of seeds of annuals and greenhouse plants; seeds of *Haplopappus pectinatus*. SWATTON, Mrs., Durban, Natal; seeds of *Pachypodium swaticum*. SWINDELL, Rev. F. G., Uckfield, Sussex; roots of *Saponaria officinalis* fl. pl.

(To be continued.)

EXTRACTS FROM THE PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

NOTICES TO FELLOWS.

CHELSEA FLOWER SHOW.

The Chelsea Flower Show was an undoubted success, and, as is fitting in this Coronation Year, the exhibits were on the whole more beautiful than in previous years.

The rearrangement of the Show, with two large marquees instead of one large marquee and a series of small tents, was a great improvement. Even at the most popular hours the crowding was not unpleasant, and generally there seemed to be plenty of room in the tents. It is evident that many Fellows were wise enough to make their visit to the Show either in the early hours of the morning, or the later hours of the evening, and this probably helped to lessen the mid-day crowds.

Their Majesties The King and Queen, Queen Mary, Their Royal Highnesses The Duke and Duchess of Gloucester, The Duke and Duchess of Kent, The Princess Royal, and other members of the Royal Family honoured the Society by visiting the Show.

One remarkable feature of the Show was the Empire Exhibit—a collection of plants drawn together from all parts of the British Empire and supplemented by plants from the Royal Botanic Gardens, Kew, and various private gardens and nurseries of this country—staged according to the countries of which the plants were native. The object of the exhibit was to give some indication as to the contributions the various parts of the Empire have made towards our gardens. The exhibit covered an area of 1,800 square feet, and was divided into five groups representing each of the Dominions and India, and four smaller groups for the Colonial dependencies and Mandated Territories. The whole of the exhibit was staged under the direction of Mr. J. Coutts, V.M.H., Curator of the Royal Botanic Gardens, Kew.

The Council is very grateful to all the friends of the Society overseas and at home who so generously came forward to help in making this exhibit in which Their Majesties The King and Queen were particularly interested.

Particulars of the awards made at Chelsea will be found on pages cix and cxii.

HORTICULTURAL COLOUR CHART.

Owing to the vast amount of work involved in the compilation of the Horticultural Colour Chart it has not been possible to publish it as soon as had been anticipated. The work on the Chart is, however, progressing, and the first volume will appear at the earliest possible moment.

Anyone desiring further particulars about this Chart is asked to write to the Secretary. Applications for the first volume at the price of 10s. a copy, exclusive of postage, will be accepted up to the date of publication. After publication copies will only be available at that price until the Society's limited stock is exhausted, when the price will be £1 1s. a copy.

SUBSCRIPTIONS.

Fellows are reminded that anyone joining the Society after July 1 and before October 1 will be required to pay only a half-year's subscription, and will receive the monthly JOURNAL commencing with the July number. Those joining after October 1 and before January 1 pay a full year's subscription, which entitles them to all the privileges of Fellowship until January 1, 1939. Back numbers of the JOURNAL are obtainable by Fellows at 9d. a number.

cii PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

CALENDAR.

July 6, 12 noon to 7.30 P.M.—Fortnightly Meeting and Show of Lilies and other flowers in season. At this Show there will be special competitions for Lilies, the entries for which closed on June 30.

July 6, 1 to 7.30 P.M.—Alpine Garden Society's Show in the Old Hall.

At 3.30 P.M. on July 6, in the Lecture Room of the New Hall, the Lily Group will meet and discuss 'Lilies Exhibited.'

At 7 P.M. on July 6, in the Restaurant of the New Hall, the Lily Group Dinner will take place, following which there will be a discussion on "The Decorative Value of Lilies."

July 7, 10 A.M. to 5 P.M.—Fortnightly Meeting and Show of Lilies and Flowers in Season, and Alpine Garden Society's Show, continued.

July 9, 1 to 7.30 P.M.—Civil Service Horticultural Federation's Exhibition in the New Hall.

July 13, 1 to 7.30 P.M.—National Carnation and Picotee Society's Diamond Jubilee Show in the Old Hall.

July 14, 10 A.M. to 5 P.M.—National Carnation and Picotee Society's Diamond Jubilee Show, continued.

July 16, 2.30 to 9 P.M.—London Gardens Society Exhibition of Flowers.

July 20, 12 noon to 7.30 P.M.—Fortnightly Meeting and Show of Flowers in Season. On this occasion there will be three competitions: one for the best hybrid Lily (continued from the last Show) one for Scented Roses, for which the Clay Cup will be awarded, and one for Hardy Flowers. Full particulars will be found below.

At 3.30 P.M. on July 20, in the Lecture Room of the New Hall, Major G. CHURCHER will lecture on "The Modern Gladiolus."

July 21, 10 A.M. to 5 P.M.—Fortnightly Meeting and Show of Flowers in Season, continued.

July 21 and 22, 2 P.M. to 4 P.M.—Practical Demonstration at Wisley on Summer Pruning of Fruit Trees and Shrubs. See p. ciii.

August 4 (Wednesday), 12 noon to 6 P.M.—Fortnightly Meeting and Show of Flowers in Season.

August 17, 12 noon to 6 P.M.—Fortnightly Meeting and Show of Flowers in Season. On this occasion the Foremarke Cup will be offered for award to Gladioli. See p. ciii.

At 3.30 P.M. in the Lecture Room of the New Hall, on August 17, Mr. D. E. GREEN, M.Sc., will lecture on "Control of Antirrhinum Rust."

August 17, 1 to 7.30 P.M., and August 18, 10 A.M. to 5 P.M.—British Gladiolus Society's Show in the Old Hall.

August 25 and 26, 2 P.M. to 4 P.M.—Practical Demonstration at Wisley on "Vegetative Propagation of Plants." See p. ciii.

August 31, 12 noon to 6 P.M.—Fortnightly Meeting and Show of Flowers in Season.

At 3.30 P.M. in the Lecture Room of the New Hall, on August 31, Mrs. V. HIGGINS, M.A., will lecture on "Desert Plants."

HALL LETTINGS.

From *September 1 to 4* there will be a Honey Show in the Old Hall. Fellows interested are invited to write to the organizer, W. E. HAMLIN, Esq., at 3 St. Mark's Place, Wimbledon, S.W. 19, for fuller particulars.

BANKSIAN MEDAL OFFERED FOR NEW HYBRID LILY.

A Banksian Medal is offered for award to the amateur who exhibits at the Fortnightly Show on *July 6 and 7*, or at the Fortnightly Show on *July 20 and 21, 1937*, the best hybrid Lily which has not received a Certificate of Preliminary Commendation, an Award of Merit, or a First-class Certificate beforehand. Entries for the Show on *July 6 and 7* closed on *June 30*, but those wishing to compete at the Show on *July 20 and 21* should apply to the Secretary for an entry form which should be completed and returned to the Secretary's office not later than by the first post on Wednesday, *July 14*.

CLAY CUP FOR ROSES.

On Tuesday, *July 20*, the Clay Cup will be offered for award to the raiser of a Rose of good form and colour, not in commerce before the current year, and possessing the true old Rose scent, such as may be found in the old 'Cabbage' or 'Provence' Rose, in 'General Jacqueminot,' 'Marie Baumann,' 'Duke of Wellington,' 'General McArthur,' etc. The scent known as "tea rose" is not, for the purposes

of the competition, to be counted the true old rose scent. Not more than three different varieties may be shown by one competitor, and at least three and not more than six blooms or trusses of each variety will be required, together with a plant in flower and bud. The cup will be awarded only once for the same rose. This competition is open to trade and amateur growers, and entries must be made on special forms, obtainable from the Secretary, by whom the completed forms must be received not later than by the first post on Wednesday, *July 14*.

COMPETITIVE CLASSES FOR AMATEURS.

Hardy Flowers.

At the Fortnightly Show on *July 20* there will be two competitive classes for exhibits of Hardy Flowers sent in by amateurs :

Class A.—12 kinds of hardy flowers, 1 vase of each. Annuals, biennials, shrubby plants and trees, and plants which have been wintered under glass, excluded ; bulbous plants allowed.

First prize, 60s. ; Second, 45s. ; Third, 30s.

Class B.—1 vase of a hardy flower. Annuals, biennials, shrubby plants and trees and plants which have been wintered under glass excluded ; bulbous plants allowed.

First prize, 20s. ; Second, 15s. ; Third, 10s.

Entries should be made on special forms obtainable from the Secretary, by whom the completed forms must be received not later than by the first post on Wednesday, *July 14*.

PRACTICAL DEMONSTRATIONS AT WISLEY.

Weather permitting, the following demonstrations of horticultural operations will be given during July and August :

Summer Pruning of Fruit Trees and Shrubs, on *July 21* and *22*.

Vegetative Propagation of Plants, on *August 25* and *26*.

Both these demonstrations will take place between 2 and 4 P.M. Fellows who intend to be present at a demonstration should notify THE DIRECTOR, R.H.S. Gardens, Wisley, Ripley, Surrey, beforehand, so that adequate arrangements can be made.

FOREMARKE CUP FOR GLADIOLI.

At the Fortnightly Show on *August 17*, the Foremarke Challenge Cup will be offered for award to trade and amateur growers for an exhibit of twenty spikes of named Gladioli in not less than ten varieties and not more than two spikes of any one variety. Entries must be made on special forms, obtainable from the Secretary, by whom the completed forms must be received not later than by the first post on Wednesday, *August 11*.

WHITE FLY PARASITE.

Where the parasite of the greenhouse white fly, *Encarsia formosa*, has been introduced, it has proved extremely effective in checking the increase of this pest under glass, and large numbers have been distributed during the past few years. The demand has become so great that, in order to meet in a measure the cost of maintaining the parasite over the difficult winter months and packing and despatching it, the Council has fixed a charge of 2s. 6d. for a supply for a small house and 5s. for a large house, and applications for it should be accompanied by the sum named. It is useless to introduce it to houses until the average temperature is about 70° F. It is hoped that Fellows who have found it successful will distribute it in their neighbourhood.

Applications with the appropriate sum of money should be sent to THE DIRECTOR, R.H.S. Gardens, Wisley, Ripley, Surrey.

INSPECTION OF GARDENS.

Many Fellows may not be aware of the terms under which their gardens can be inspected by the Society's Garden Inspector, and advice given thereon. They are set out below, and it will be seen that special arrangements can be made when Fellows living in the same district co-operate.

"The inspection of Gardens belonging to Fellows is conducted by a thoroughly competent Inspector from the Society, who reports and advises at the following cost, viz. : a fee of £3 3s. for one day (or £5 5s. for two consecutive days), together with all out-of-pocket expenses. No inspection may occupy more than two days, save by special arrangement. Should

two or more Fellows residing in the same district, with their Gardens within easy reach of one another, desire to have the services of the Garden Inspector, arrangements will be made for such a combined inspection and the fee and expenses divided by consent of those concerned. Fellows wishing for the services of an Inspector are requested to give at least a week's notice and choice of two or three days, and to indicate the most convenient railway station and its distance from their garden. Gardens can only be inspected at the written request of the owner.

WISLEY IN JULY.

Trials and Collections.—While the Delphiniums are likely to be past their best the Sweet Peas in the Trial Grounds should still be flowering, and here also are Sidalceas, Border Carnations, Gladioli, Bedding Lobelias and Montbretias. The collections of Roses, both beside the walk from the entrance gates and in the long borders traversing the hillside, will be an attraction at least in the earlier part of this month, while the groups of annuals near the Pear orchard are another attractive feature.

Rock Garden and Alpine House.—In the beds beside the Alpine House grow the brilliant and sun-loving Gazanias, which flower throughout the summer. Although late in the season, there will still be a few plants in bloom in the house itself, of which perhaps *Gilia californica*, *Cyananthus Wardii*, *Triptilion spinosum*, *Linum viscosum*, *Thymus membranaceus*, and *Conandron ramondoides* will be the chief. Other genera represented in flower on the rock garden are Geranium, Dianthus, Gentiana, and Linum, and a few plants especially worthy of mention are that gay little Pimpernel *Anagallis collina*, the first of the blue Periwinkle-like *Cyananthus*, *C. lobatus*, the scarlet *Verbena chamaedryfolia*, and pale blue *Codonopsis clematidea*.

In the Wild Garden are many species and a few hybrid Lilies, including *Lilium giganteum*, *L. Scovitsianum*, *L. superbum*, *L. Willmottiae*, *L. Davidi*, *L. Wardii*, and in the Bamboo Walk leading up to the hill, *L. regale*. Meconopsis are also very evident at this season, when *Meconopsis napaensis* (Wallichii) is in bloom and probably some of the earlier species, such as *M. paniculata* are not yet over. The latest Primulas, in *Primula Florindae* and *P. microdonta* forms, together with *Campanula lactiflora* and *C. latifolia alba* make a very charming contrast in colours, while two shrubs of note are *Myrtus Luma* and *Magnolia virginiana*. *Orchis foliosa* on the ditch-side is happily placed and flowers annually.

Seven Acres.—This is one of the brightest periods in this part of the Gardens, when many of the shrubs are set with flowers, and this year should be particularly fine, judging by the displays earlier in the season. Spiraeas, *Hypericum patulum* varieties, Berberis, Cotoneasters, Deutzias, and Escallonias are some of them, and in the pond the Water Lilies push up their cream, white or red blossoms.

Among the Heathers the several forms of *Erica cinerea*, the Bell Heather, of *E. Tetralix*, the Cross-leaved Heath, and of *Daboecia cantabrica*, the Connemara, or St. Dabeoc's Heath, commence flowering in hues of pink, rose, crimson and white, while the last of the Brooms, *Genista aethnensis* and *Spartium junceum* are covered with masses of sweet-scented yellow blossoms.

Miscellaneous.—Now the herbaceous border begins to draw attention and to make a pleasing show of summer flowers, both annuals and perennials, too numerous to detail. In the Award of Merit Garden large plantings of *Salvia superba* (virgata nemorosa), *Monarda didyma* 'Cambridge Scarlet,' and of *Erigeron speciosus* 'Quakeress' make patches of colour seen from afar, and here also is the Californian Tree Poppy, *Romneya Coulteri*, with its huge single white blooms centred with golden anthers.

Greenhouses.—In the large Temperate House the yellow-flowered *Pentstemon antirrhinoides* is an unusual Californian shrub worthy of attention, and the blue *Plumbago capensis*, *Ipomaea Learii* climbing over one of the roof supports, and the finest species of the genus in cultivation, *Solanum Wendlandii*, are all most showy plants for such a house. The second house, towards the Laboratory, will probably contain Pelargoniums and many varieties of hybrid Fuchsias, whilst in the Half-hardy House the brilliant red *Rhoeo coccinea*, Mesembryanthemums, violet-blue *Thunbergia natalensis*, *Calceolaria alba*, the feathery-foliaged *Statice ornata*, the bushy pink-flowered *S. rosea*, and *Mitrasia coccinea* with croziers of vermilion are amongst the plants to be seen.

Laboratory Wall.—Here are a few shrubs to catch the eye, notably *Escallonia Iveyi*, with fine panicles of white flowers and glossy green foliage, on the east and shady side. On the west front that splendid Rose 'Mermaid' with its great single yellow blooms, the graceful pink *Abelia Schumannii* which has such a long flowering season, *Senecio lanifolius*, and the curiously fashioned *Abutilon megapolitanicum*.

GENERAL MEETINGS.

APRIL 24, 1937.

JOINT RHODODENDRON COMMITTEE.—At Exbury.**Awards Recommended :—***Award of Merit.**Rhododendron* 'Elsbeth' (votes unanimous). See p. 324. Sent for trial by Messrs. Slocock, Woking.

APRIL 27, 1937.

AT BRITISH CARNATION SOCIETY'S SHOW.

JOINT PERPETUAL FLOWERING CARNATION COMMITTEE.—Mr. J. M. BRIDGEFORD in the Chair, and ten other members present.**Awards Recommended :—***Award of Merit.*

To Carnation 'Celia' (votes unanimous), for market, shown by Messrs. C. Engelmann, Saffron Walden, Essex. See p. 321.

Other Exhibits.

Messrs. Allwood Bros., Haywards Heath, Sussex : Carnations 'Lady Hudson,' 'Scarlet Pelargonium' (to be seen again), and 'Greatheart' (to be seen again).

W. Cooper, Esq., Clanna, nr. Sidney, Glos. : Carnation 'Jasper Clutterbuck,' Messrs. C. Engelmann : Carnations 'Freda' (to be seen again) and 'Sunray' (to be seen again).

H. S. Hare, Esq., The Parade, Taunton : Carnation 'Cherry.'

MAY 1, 1937.

JOINT RHODODENDRON COMMITTEE.—At Exbury.**Awards Recommended :—***Award of Merit.*To *Rhododendron* 'Handel' (votes 7 for, 2 against). See p. 324.

MAY 4, 1937.

SCIENTIFIC COMMITTEE.—Mr. E. A. BOWLES, M.A., F.L.S., F.R.E.S., V.M.H., in the Chair, and three other members present.*Muscari, proliferous.*—Mr. E. M. Blackburn, of Fairway Cottage, Henley-on-Thames, showed a curious form of *Muscari*, apparently a seedling from the var. 'Heavenly Blue' which had appeared in his garden. The individual flowers were double, apparently owing to the multiplication of perianth segments. The spike itself was branched so as to form a rounded oblong head of many flowers, each of which was subtended by a small bract, the lateral branches being again branched.*Tulips from Crete, etc.*—Mr. G. P. Baker showed two Tulips, one related to *Tulipa saxatilis*, the other a form which could not be named.**FRUIT AND VEGETABLE COMMITTEE.**—Mr. E. A. BUNYARD, F.L.S., in the Chair, and fourteen other members present.**Exhibits.**

Waterperry Horticultural School, Ltd., nr. Oxford : Strawberries in pots.

R.H.S. Commercial Fruit Trials, Wisley : Apples 'Heusgen's Golden Reinette' and 'Ontario.'

FLORAL COMMITTEE A.—Mr. J. M. BRIDGEFORD in the Chair, and sixteen other members present.**Awards Recommended :—***Silver Flora Medal.*

To Messrs. Allwood, Haywards Heath, for Carnations.

cvi PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

Silver Banksian Medal.

- To Messrs. F. Cant, Colchester, for Roses.
- To Mr. J. Douglas, Great Bookham, for Auriculas.
- To Messrs. Engelmann, Saffron Walden, for Carnations, Antirrhinums and Pansies.

- To Messrs. Kelway, Langport, for Tree Pæonies.
- To Messrs. Napier, Taunton, for Carnations.
- To Messrs. Peed, West Norwood, for Gloxinias.

Flora Medal.

- To Ashington Nurseries, Ashington, for Carnations.
- To Messrs. B. R. Cant, Colchester, for Roses.
- To Messrs. Low, Enfield, for Carnations and Hippeastrums.

Banksian Medal.

- To Messrs. Allwood, Haywards Heath, for *Dianthus Allwoodii*.
- To Mr. F. J. Bell, Whitley Bay, for Violas.
- To Mr. H. G. Longford, Abingdon, for Polyanthuses and Tulips.
- To Messrs. Simmons, Finchley, for Violas.

Selected for Trial at Wisley.

- Viola 'Iden Gem,' from Miss L. Wamsley, Staplehurst.

Other Exhibits.

- Messrs. Clark, Dover : hardy plants.
- Mr. F. Clayton, Baildon : Pelargonium 'Dinah.'
- Mrs. Lloyd Edwards, Trevor : Polyanthus 'Robin Hood.'
- Mrs. A. Freemantle, Penn : Polyanthus.
- Baron Bruno Schröder, Englefield Green : Hippeastrums 'Coronation' and 'Red Velvet.'
- Messrs. Spencer, Hockley : Dahlias.
- Messrs. Waterer, Sons & Crisp, Twyford : Geum 'Red Wings.'

FLORAL COMMITTEE B.—Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and sixteen other members present.

Awards Recommended :—

Silver Banksian Medal.

- To Messrs. Cheal, Crawley, for flowering trees and shrubs.

Flora Medal.

- To Brookside Nurseries, Oxford, for a group of *Daphne rupestris grandiflora* and *Androsace cylindrica*.
- To Mr. W. A. Constable, Southborough, for Lilies, Nomocharis and Narcissi.
- To Messrs. H. J. Haskins, Bournemouth, for Clematis.
- To Mr. E. Ladhams, Elstead, for shrubs and rock garden plants.
- To Messrs. Neale, Worthing, for Gazanias and succulents.
- To Orchard Neville Nurseries, Baltonsborough, for rock garden plants.
- To Messrs. Prichard, Christchurch, for rock garden plants.
- To Mr. G. E. Welch, Cambridge, for rock garden plants.
- To Messrs. Stuart Low, Enfield, for flowering shrubs.

Banksian Medal.

- To Messrs. Barr, Taplow, for Primulas, Tulips and Narcissi.
- To Messrs. Bedford & Page, Cambridge, for rock garden plants.
- To Messrs. Burkwood & Skipwith, Kingston, for flowering shrubs.
- To Colesbourne Gardens, Cheltenham, for Fritillarias and other bulbous plants.
- To Mr. A. Corderoy, Eltham, for rock garden plants.
- To Messrs. Elliott, Stevenage, for rock garden plants.
- To Messrs. Fielden & Crouch, Wrotham, for rock garden plants.
- To Marsden Nursery, Ashted, for rock garden plants.
- To Messrs. Maxwell & Beale, Broadstone, for rock garden plants.
- To Messrs. Redgrove & Patrick, Sevenoaks, for rock garden plants.
- To Mr. J. Robinson, Eltham, for rock garden plants.
- To Messrs. Rogers, Southampton, for rock garden plants.
- To Messrs. Russell, Windlesham, for flowering shrubs.
- To Messrs. Waterer, Twyford, for rock garden plants.

First-class Certificate.

- To *Prunus serrulata* 'Kanzan' as a hardy flowering tree (votes unanimous), from Mr. R. C. Notcutt, Woodbridge. See p. 324.

Award of Merit.

- To *Calceolaria picta* as a flowering plant for the cool-house (votes unanimous), from the Director, John Innes Horticultural Institution, Merton. See p. 321.

To *Gaultheria Forrestii* as a hardy flowering shrub (votes unanimous), from G. Johnstone, Esq., Gwinear Road, Cornwall. See p. 322.

To *Prunus* 'Asor' as a hardy flowering tree (votes 9 for), from Collingwood Ingram, Esq., Benenden. This award was recommended, subject to naming, on April 6, 1937. See p. 324.

Selected for trial at Wisley.

Clematis alpina var. *rosea*, *C. alpina* var. 'Columbine,' and *C. macropetala* var. 'Ruby.' Sent by Mr. E. Markham, East Grinstead.

Other Exhibits.

T. T. Barnard, Esq., Wareham: *Dietses spathacea*, *Gladiolus striatus*, forms of *Hemeria ochroleuca*.

Boxhill Committee of National Trust: *Malus Arnoldiana*.

Messrs. Cheal, Crawley: rock garden plants.

Messrs. Garway, London, W. 1: succulents.

T. Hay, Esq., Hyde Park, W. 2: *Buddleia hastata*.

Miss Hopkins, Coulsdon: rock garden plants.

Mr. L. Lawrence, Taplow: succulents.

Messrs. Mackenzie, Ilkley: *Primula Sieboldii* × *P. cortusoides*.

Mrs. Maurice Pope, Chippenham: *Lathyrus pubescens*.

Messrs. Russell, Windlesham: *Bougainvillea* 'Orange King.'

Sandon Nurseries, Chelmsford: rock garden plants.

Mr. R. Colpoys Wood, West Drayton: flowering shrubs.

ORCHID COMMITTEE.—Sir JEREMIAH COLMAN, Bt., in the Chair, and eleven other members present.

Awards Recommended:—

Award of Merit.

To *Odontoglossum* × 'Molyneux' var. 'Shalstone' (*O. crispum* × *O. plump-tonense*) (votes 8 for, 3 against), from H. S. Wharton, Esq., "Shalstone," Templewood Avenue, London, N.W. 3. See p. 323.

Other Exhibits.

Messrs. Charlesworth, Haywards Heath: a group.

Messrs. Stuart Low, Jarvis Brook: a group.

NARCISSUS AND TULIP COMMITTEE.—Mr. E. A. BOWLES, M.A., F.L.S., F.R.E.S., V.M.H., in the Chair, and ten other members present.

Awards Recommended:—

Gold Medal.

To Mr. Guy L. Wilson, Broughshane, Co. Antrim, for an exhibit of Daffodils.

Silver-gilt Banksian Medal.

To Messrs. Barr, 11 King Street, Covent Garden, W.C. 2, for an exhibit of Tulips.

To Messrs. Dobbie, Edinburgh, for an exhibit of Tulips.

Silver Flora Medal.

To Messrs. R. H. Bath, Wisbech, for an exhibit of Daffodils and Tulips.

To Messrs. J. R. Pearson, Lowdham, for an exhibit of Daffodils.

Silver Banksian Medal.

To Messrs. Daniels, Norwich, for an exhibit of Daffodils and Tulips.

To Messrs. D. Stewart, Ferndown Nurseries, Wimborne, for an exhibit of Daffodils and Tulips.

To Messrs. Wakeley, Bankside, S.E. 1, for an exhibit of Daffodils.

First Class Certificate.

To *Narcissus* 'Principal' as a variety for exhibition (votes 9 for). This yellow trumpet variety (Division 1a) received an Award of Merit on April 16, 1935. See JOURNAL R.H.S., 60, p. 273. Shown by Mr. Guy L. Wilson.

Award of Merit.

To *Narcissus* 'Dava' as a variety for exhibition (votes 9 for), shown by Mr. Guy L. Wilson. See p. 323.

Selected for Trial.

Narcissus 'Prince,' shown by Messrs. R. H. Bath, was selected for trial at Kirton as a variety for cutting from the open for market, and for trial at Wisley as a variety for garden decoration.

Other Exhibits.

Sir William FitzHerbert, Bt., Tissington Hall, Ashbourne, Derbyshire : *Narcissus* 'Wibbern.'

C. F. Coleman, Esq., Broomhill, Hartley, Cranbrook : *Narcissus pallidiflorus* and *N. abscissus*.

Messrs. R. H. Bath : *Narcissus* 'Arcadia.'

Mr. Guy L. Wilson : *Narcissus* 'Sincerity,' *N.* 'Glenariff,' *N.* 'Aleppo,' *N.* 'Dunkeld,' and *N.* 'Thoroughbred.'

G. P. Baker, Esq., V.M.H., Sevenoaks : A Tulip species collected in Crete, and another which was said to grow on the roofs of cottages in Kashmir, were referred to the Scientific Committee. See p. cv.

Captain H. E. Buxton, Snape, Suffolk : *Narcissus* 'H. E. Buxton.'

JOINT IRIS COMMITTEE.—Mr. G. W. LEAK in the Chair, and six other members present.

Selected for Trial at Wisley.

Iris 'Puck,' 'Gentius,' 'Balroudour' and seedling P. 31/17, all shown by F. Wynn Hellings, Esq., Fleur-de-lis, Grove Way, Esher, Surrey.

JOINT RHODODENDRON COMMITTEE.—Mr. J. B. STEVENSON in the Chair, and seventeen other members present.

Awards Recommended :—

First-class Certificate.

To *Rhododendron Lindleyi* (K.W. 8546) (votes 13 for), from Admiral Walker-Heneage-Vivian, Clyne Castle, Swansea. See p. 324.

Award of Merit.

To *R. Wardii* × *R. Williamsianum* (votes 14 for), from Lord Aberconway, Bodnant, N. Wales.

Other Exhibits.

Lt.-Col. E. H. W. Bolitho, Trengwainton, Heamoor, Cornwall : *R.* × 'Cornish Cream' (*R. campylocarpum* × (*R. Fortunei* × *R. orbiculare*)) ; *R. prunifolium* ; and *R. K.W. 8016* (*R. dendricola* ?) (to be seen again).

A. M. Williams, Esq., Werrington Park, Launcester : *R.* × 'May Day' (*R. haematodes* × *R. Griersonianum*).

The Marchioness of Londonderry, Mount Stewart, Newtownards : *R. campylocarpum* var.

Admiral Walker-Heneage-Vivian : *R.* × 'White Lady' (*R.* × *hewense* × *R. decorum*) ; *R.* × 'Lucy Locket' (? × *R. Loderi*).

Mountifort Longfield, Esq., Penryn, Cornwall : several different seedlings of the cross *R.* 'Alice' × *R. Griffithianum*.

Lady Martineau, King's Bourne, Wentworth, Surrey : *Rhododendron artoquameum*.

JOINT ROCK GARDEN PLANT COMMITTEE.—Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and six other members present.

Awards Recommended :—

Award of Merit.

To *Chrysanthemum Catananche* as a hardy rock garden or alpine house plant (votes 5 for), from Mrs. R. Lukin, Burghfield Common, Berks, and Dr. R. Seligman, Wimbledon, S.W. 19. See p. 321.

To *Corydalis tomentella* as a plant for the alpine house (votes 5 for), from the Director, R.H.S. Gardens, Wisley. See p. 321.

To *Fritillaria glauca* as a hardy rock garden or alpine house plant (votes 3 for, 1 against), from Col. C. H. Grey, Cranbrook. See p. 322.

To *Fritillaria Purdyi* as a hardy rock garden plant (votes 5 for), from Col. C. H. Grey. See p. 322.

Other Exhibits.

P. H. Davis, Esq., East Grinstead : *Eritrichium terglowiense*, *Sedum Palmeri*.

Mrs. Lloyd Edwards, Trevor, nr. Wrexham : Aubrietia 'Glory of the Garden,' A. 'Trevor Rose,' Primula 'Kinlough Beauty.'

Col. C. H. Grey, Cranbrook : *Viola pedata*.

Mrs. R. Lukin, Burghfield Common, Berks : *Ononis minima*, *Serapias cordigera*.

Director, R.H.S. Gardens, Wisley : *Dianthus Freynii*.

MAY 15, 1937.

JOINT RHODODENDRON COMMITTEE.—At Exbury.

Awards Recommended :—

*Award of Merit.*To *Rhododendron* 'White Swan' (votes unanimous). See p. 325.

MAY 22, 1937.

JOINT RHODODENDRON COMMITTEE.—At Exbury.

Awards Recommended :—

*First-class Certificate.*To *Rhododendron* 'Britannia' (votes unanimous). See p. 324.*Award of Merit.*To *Rhododendron* 'Marinus Koster' (votes unanimous). See p. 325.

MAY 25, 1937.

AT CHELSEA.

FRUIT AND VEGETABLE COMMITTEE.—Mr. W. H. DIVERS, V.M.H., in the Chair, and nineteen other members present.

Selected for trial at Wisley.

Apple 'Sussex Pippin,' from Mr. F. Streeter, Petworth Park Gardens, Petworth.

Other Exhibits.

Mr. E. A. Bunyard, Allington, Maidstone: Apple 'Cox's Orange Pippin.'

Mr. F. Streeter: Apples 'Kings Acre Pippin' and 'Lane's Prince Albert.'

FLORAL COMMITTEE A.—Mr. J. M. BRIDGEFORD in the Chair, and twenty-one other members present.

Awards Recommended :—

Award of Merit.

To *Begonia* 'R. R. Anderson' as a greenhouse pot plant (votes 16 for), from Messrs. Blackmore & Langdon, Bath. See p. 321.

Selected for trial at Wisley.

Antirrhinum 'Foxwell' from Mr. D. Foxwell, Balcombe.

Dianthus Allwoodii 'Bridget' from Messrs. Allwood, Haywards Heath.

Gerbera Jamesonii hybrida fl. pl. from Messrs. Engelmann, Saffron Walden.

Salvia 'White Rocket' from Messrs. W. Christiansen, Southall.

Other Exhibits.

Messrs. Allwood, Haywards Heath: Pink 'Musgrave's Pink.'

Messrs. Artindale, Sheffield: *Viola* 'Coronation.'

Messrs. Blackmore & Langdon, Bath: *Begonia* 'Florence Bush' (A.M. 1936).

John Innes Horticultural Institution, Merton: *Cineraria* 'Beauty of Cambridge.'

Messrs. Letts, Hadleigh: Polyantha Rose.

Sir F. W. Moore, V.M.H., Rathfarnham: *Primula pulverulenta* 'Willbrook Seedling.'

Mr. T. Robinson, Nottingham: Rose 'Peon.'

Messrs. Sluis en Groot, Enkhuizen: Pansy 'Coronation Gold.'

FLORAL COMMITTEE B.—Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and twenty-two other members present.

Awards Recommended :—

First-class Certificate.

To *Leptospermum scoparium roseum* as a hardy flowering shrub (votes 12 for, 2 against), from the Rev. Canon A. T. Boscawen, Ludgvan Rectory, Cornwall. See p. 322.

Award of Merit.

To *Cypripedium speciosum*, Siberian form, as a hardy flowering plant (votes unanimous), from Lt.-Col. C. H. Grey, D.S.O., Cranbrook. See p. 322.

To *Daphne* \times *Burkwoodii* var. 'Somerset' as a hardy flowering shrub (votes unanimous), from Messrs. J. Scott & Co., Merriott. See p. 322.

CX PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

To *Lilium* × 'Lyla McCann' as a hardy flowering plant (votes 16 for, 1 against), from Messrs. W. A. Constable, Southborough. See p. 323.

To *Lilium Davidi* var. 'Oriole' as a hardy flowering plant (votes 15 for, 2 against), from Messrs. W. A. Constable, Southborough. See p. 323.

To *Meconopsis* × *Sheldoni* as a hardy flowering plant (votes 14 for), from W. G. Sheldon, Esq., Oxted. See p. 323.

To *Paeonia* × 'Argosy' as a hardy flowering plant (votes 11 for, 1 against), from Major F. C. Stern, Goring-by-Sea. See p. 323.

To *Pancratium illyricum* as a tender flowering plant (votes unanimous), from Dame Alice Godman, D.B.E., Horsham. See p. 323.

Other Exhibits.

Sir F. D. Acland, Bart., Exeter: *Ageratum* sp.

Messrs. Baggesen, Pembury: *Cytisus* 'Acton Phillips.'

A. Baker, Esq., Bromley: *Paeonia pubens*.

G. P. Baker, Esq., Sevenoaks: *Paeonia obovata rosea*, *P. decora*, *P. Smendhii*, *Schizandra rubrifolia*.

The Rev. Canon Boscawen, Ludgvan: *Telopea truncata*.

Messrs. Constable, Southborough: *Lilium* × 'Lilian Cummings.'

Dame Alice Godman, D.B.E., Horsham: *Lomatia obliqua*, *Pelargonium* sp.

Miss Hopton, Hereford: *Ononis rotundifolia*, *Trachelospermum jasminoides*, *Gypsophila* sp.

Miss Howell, Aberdovey: *Maurandia Barclayana*.

Lady Lawrence, Dorking: *Ochna serrulata*.

Mr. E. Markham, East Grinstead: *Clematis sibirica alba*, *C. verticillata columbiana*.

Lady Martineau, Kings Bourne: *Moricandia sonchifolia*.

Mr. Amos Perry, Enfield: *Lychnis Flos-cuculi* 'Her Majesty,' *Nasturtium officinale variegatum*.

The Lady Rayleigh, Chelmsford: *Corokia Coloneaster*.

Messrs. Stark & Son, Fakenham: *Polygonum sericeum*.

Mrs. J. E. Tomkinson, Twyford: seedling Brooms.

Messrs. Wallace, Tunbridge Wells: *Lilium Thunbergianum* 'The President.'

W. I. Whitaker, Esq., Lymington: *Cornus Kousa*, *Cytisus sessilifolius*, *Wistaria floribunda* fl. pl.

ORCHID COMMITTEE.—Sir JEREMIAH COLMAN, Bart., in the Chair, and twenty-three other members present.

Awards Recommended:—

First-class Certificate.

To *Vanda* × *Rothschildiana* var. 'Alpha' (*coerulea* × *Sanderiana*) (votes 20 for), from Messrs. Sanders, St. Albans.

Award of Merit.

To *Miltonia* × 'Albanian' var. 'Her Majesty' ('*Lycaena*' × 'St. Alban') (votes 14 for, 3 against), from Messrs. Sanders, St. Albans.

To *Lycaste* × 'Queen Elizabeth' (Sander's var.) ('*Locusta*' × *Shinnori alba*) (votes 15 for), from Sir Jeremiah Colman, Bart., Gatton Park, Reigate.

To *Angulocaste* × 'Georgius Rex' (*Anguloa Cliftonii* × *Lycaste* × *Imschootiana*) (votes 13 for, 2 against), from Sir Jeremiah Colman, Bart.

To *Oncidium luridum* var. 'Golden Glory' (votes 15 for, 2 against), from Sir Jeremiah Colman, Bart.

To *Odontoglossum citrosimum* var. 'Princess Mary' (votes 14 for, 1 against), from Sir Jeremiah Colman, Bart.

To *Vuylistearea* × 'Josephine Kirkpatrick' (*Odontonia* × 'Nesta' × *Vuylistearea* × 'Aspasia') (votes 13 for, 2 against), from N. Prinsep, Esq., The Boxes, Pevensey.

To *Cymbidium* × 'Dorchester' var. 'Magnolia' (*Alexanderi* × 'Tityus') (votes 14 for, 6 against), from N. Prinsep, Esq.

To *Odontoglossum* × 'Jacquinetta' ('Frank Reader' × 'Tityus') (votes 19 for), from Messrs. Armstrong & Brown, Tunbridge Wells. See p. 323.

To *Renanthera Imschootiana* var. 'Cardinal' (votes 13 for, 3 against), from Messrs. Armstrong & Brown. See p. 324.

To *Laeliocattleya* × 'Alma' var. 'Coronation' (*L.-c.* × 'Appam' × *L.-c.* × 'Helius') (votes unanimous), from Messrs. Armstrong & Brown. See p. 322.

To *Odontoglossum* × 'Viscountess Ullswater' ('*Ascania*' × 'Iphis') (votes 15 for), from F. J. Hanbury, Esq., Brockhurst, East Grinstead.

To *Cymbidium* × 'Profession' var. 'Grand Monarch' ('*Ceres*' × 'Vesta') (votes 14 for, 3 against), from Messrs. McBean, Cooksbridge.

To *Cymbidium* × 'Cremona' var. 'Indian Prince' (*Cooperi* × 'Cygnets') (votes 13 for, 3 against), from Messrs. McBean.

To *Odontoglossum* × 'Tordonia' ('Clydonia' × 'Toreador') (votes 13 for, 3 against), from Messrs. Charlesworth, Haywards Heath.

To *Miltonia* × 'Kensington' ('Kennie' × 'Memoria F. Sander') (votes 15 for), from Messrs. Flory & Black, Slough.

To *Cymbidium* × 'Bullfinch' (*Alexanderi* × 'Garnet') (votes 15 for, 2 against), from Lionel de Rothschild, Esq., Exbury.

Cultural Commendation.

To Mr. C. W. Howlett, gardener to the Hon. Mrs. Ionides, Buxted Park, Uckfield, for a well-flowered plant of *Ansellia africana*.

To Mr. Schweizer, gardener to the Rt. Hon. Lord Moyne, Heath House, Hampstead, N.W. 3, for a large plant of *Spathoglottis plicata*, with four tall and many-flowered spikes.

To Messrs. Sanders, St. Albans, for *Aerides virens* var. *Sanderae*, an albino form bearing five many-flowered spikes.

To Mr. C. Webb, gardener to H. S. Wharton, Esq., Templewood Avenue, Hampstead, N.W., for *Odontonia* × 'Nesta' with three flower-spikes.

Other Exhibits.

Nagrok Nursery, Java: *Dendrobium* × *Lousiae* (*Phalaenopsis Schroederianum* × *veratrifolium*), *Dendrobium* × 'Bali' (*Phalaenopsis Schroederianum* × *taurinum*), *Dendrobium* × *Elisabethae* ('Puppchon' × *veratrifolium*).

L. M. M. Dias, Esq., Panadura, Ceylon: *Arachnanthe Maingayi* and *Dendrobium Macarathias*.

NARCISSUS AND TULIP COMMITTEE.—Mr. W. B. CRANFIELD, F.L.S., V.M.H., in the Chair, and seventeen other members present.

The minutes of the last meeting, held on May 4, were read and confirmed.

There were no plants before the Committee.

JOINT IRIS COMMITTEE.—Mr. G. L. PILKINGTON in the Chair, and thirteen other members present.

Selected for trial at Wisley.

Iris 'Sword of State,' shown by Mr. F. Burton, The Barley House, Hildenborough.

Other Exhibits.

Mr. F. Burton, The Barley House, Hildenborough: Iris 'Lilac Satin.'

Mr. F. Wynn Hillings, Grove Way, Esher: Iris 'Southland.'

G. P. Baker, Esq., Hillside, Kippington, Sevenoaks: *Iris gracilipes*, *I. paradoxa* and *I. acutiloba*.

JOINT RHODODENDRON COMMITTEE.—Mr. E. H. WILDING in the Chair, and thirteen other members present.

Awards Recommended:—

First-class Certificate.

To *Rhododendron* × 'Firetail' (votes 11 for, 2 against), from J. J. Crosfield, Esq., Embley Park, Romsey, Hants.

To *R.* × 'Selig' (votes 11 for, 3 against), from Lady Loder, Leonardslee, Horsham, Sussex.

Award of Merit.

To *R.* × 'Decsoul' (votes 9 for, 2 against), from W. Whitaker, Esq., Pylewell Park, Lymington.

To *R.* × 'Diva' (votes 8 for, 2 against), from Lionel de Rothschild, Esq., Exbury House, Southampton.

To *R. exquisitum* (votes unanimous), from Lionel de Rothschild, Esq.

To *R.* × 'Lady Berry' (votes unanimous), from Lionel de Rothschild, Esq.

To *R.* × 'Sir Frederick Moore' (votes unanimous), from Lionel de Rothschild, Esq.

To *R.* × 'Touchstone' (votes 12 for), from J. J. Crosfield, Esq. *Selected for trial at Exbury.*

R. × 'Dr. A. Blok' (a 'Pink Pearl' hybrid), from Messrs. Hollamby's Nurseries, Groombridge, Sussex.

R. 'Clara Brown' and *R.* 'Mrs. Charles Brown' (*Azaleas*), from Messrs. D. Stewart & Son, Ferndown, Dorset.

Other Exhibits.

Lt.-Col. J. N. Horlick, Little Paddocks, Sunninghill, Ascot : *R. x 'Titnes Beauty'* (*R. Griersonianum x R. x Loderi*), and *R. x 'Coronation.'*

J. J. Crosfield, Esq. : *R. x 'Radium'* and *R. cerasinum* (K.W. 6923).

Admiral Walker-Heneage-Vivian, Clyne Castle, Swansea : *R. x 'White Ensign'* (*R. x Loderi x R. decorum*); *R. x 'Shepherd's Delight'* (*R. x Loderi x R. x Luscombei*); a hybrid, *R. discolor x R. decorum*; *R. formosum* (K.W. 7701); and *R. Maddenii* var. *calophyllum*.

Collingwood Ingram, Esq., Benenden, Kent : *R. x 'Margot'* (*R. mucronulatum x R. micranthum*).

The Marchioness of Londonderry, Mount Stewart, Newtownards, Co. Down : a *R. x Kewense* seedling.

Lt.-Col. G. H. Loder, The High Beeches, Handcross, Sussex : *R. x 'Fabia'* var. 'High Beeches'; *R. x 'Sarita Loder'* var. 'Dencombe' (to be seen again); and *R. x Griersonsplendour* (*R. Griersonianum x R. x 'Purple Splendour'*).

JOINT ROCK GARDEN PLANT COMMITTEE.—Major F. C. STERN, F.L.S., in the Chair, and ten other members present.

Awards Recommended :—

Award of Merit.

To *Campanula betulaefolia* as a hardy rock garden or alpine house plant (votes unanimous), from Stuart Boothman, Esq., Nightingale Nursery, nr. Maidenhead. See p. 321.

To *Campanula rupicola*, Giuseppe's variety, as an alpine house plant (votes 5 for, 1 against), from Dr. Giuseppe, Felixstowe. See p. 321.

Preliminary Commendation.

To *Aster* sp. (H.M. 641), from Mrs. H. Milford, Alpine Nursery, Chedworth, Glos.

To *Campanula Allionii* var. 'Silver Bells,' from F. Barker, Esq., Stevenage.

To *Campanula pilosa* var. *dasyantha*, from Mrs. G. Anley, St. George's, Woking.

To *Viola Dörfleri*, from Dr. Giuseppe, Felixstowe.

Other Exhibits.

G. P. Baker, Esq., Sevenoaks : *Prunus prostrata* var. *discolor*.

Brookside Nurseries, Headington, Oxford : *Erinus alpinus* var. 'Mrs. C. Boyle, *Rhodohypoxis platypetala* var. 'Beamish White.'

Chester Gayton, Purley, Surrey : *Sedum sarmentosum* var. *variegatum*.

Dr. Giuseppe, Felixstowe : *Achillea* sp., *Androsace sarmentosa*, *Erigeron* sp., *Geranium Renardii*.

Miss D. C. Hopton, Hereford : *Saponaria lutea*.

Messrs. W. E. Th. Ingwersen, East Grinstead : *Campanula Herminii*, *Erica umbellata* var. *stricta*, *Geranium Renardii*.

Lady Lawrence, Dorking : *Veronica pyrolaeflora*.

Messrs. Maxwell & Beale, Broadstone : *Daboecia azorica* (A.M. 1934).

Mrs. H. Milford, Chedworth, Glos. : *Crassula curta* (?), *Helichrysum* sp., *Zaluzianskya* sp.

H. F. R. Miller, Esq., Sevenoaks : *Sempervivum arachnoideum* var. *tomentosum* f. *Stansfieldii*.

Messrs. M. Prichard & Sons, Christchurch, Hants : *Dianthus squarrosus* var. *roseus*, *Lobelia Fergussonii*.

Messrs. Pulham, Bishop's Stortford : *Saxifraga catalaunica*.

Colonel and Mrs. Tennant of Innes, Elgin : *Aquilegia glandulosa*.

CHELSEA SHOW.

MAY 26, 27 AND 28, 1937.

Held in the Grounds of the Royal Hospital, Chelsea.

LIST OF AWARDS.

The Sherwood Challenge Cup, for the most meritorious exhibit in the Show.

To Messrs. Allwood, Wivelsfield Nurseries, Haywards Heath, for an exhibit of Carnations and Pinks.

The Cain Challenge Cup, offered for award for the best exhibit shown by an amateur.

To Lionel de Rothschild, Esq., O.B.E., V.M.H., Exbury House, Exbury, Southampton (grs. Mr. F. Hanger and Mr. R. Findlay), for an exhibit of Azalea hybrids.

Orchid Challenge Cup, for the best group of Orchids shown by an amateur in a space not exceeding 100 square feet.

To N. Prinsep, Esq., Pevensey Bay (gr. Mr. A. Merry).

Orchid Challenge Cup, for the best group of Orchids shown by an amateur in a space not exceeding 45 square feet.

To Capt. G. S. Brocklebank, Chingley Manor, Flimwell, Kent (gr. Mr. Boulton).

Orchid Trophy, for the best six Orchids exhibited by an amateur.

To H. S. Wharton, Esq., Shalstone, Templewood Avenue, Hampstead.

Gold Medals.

(To commemorate the Accession of King George VI, every exhibitor who is awarded a gold medal also receives a Silver-gilt Cup (fig. 88).)

To Messrs. Hocker Edge Gardens at Cranbrook, Kent, for a rock garden.

To Messrs. G. G. Whitelegg, of Chislehurst, for a rock garden.

To Messrs. William Wood, of Taplow, for a rock garden.

To Messrs. Blackmore & Langdon, of Bath, for a mixed group of Begonias, Delphiniums and Gloxinias.

To Messrs. Carters' Tested Seeds, of Raynes Park, for greenhouse and other plants from seeds.

To Messrs. Alexander Dickson, of Newtownards, for Roses.

To Messrs. Sutton, of Reading, for greenhouse plants from seeds.

To Messrs. Bees, of Chester, for a mixed group of herbaceous and bulbous plants.

To the Lord Aberconway, C.B.E., V.M.H., of Bodnant, Tal-y-Cafn, N. Wales (gr. Mr. F. C. Puddle), for Rhododendrons and Primulas (Bodnant hybrids).

To Messrs. Hillier, of Winchester, for trees and shrubs.

To J. Pierpont Morgan, Esq., LL.D., D.C.L., D.Sc., of Wall Hall, Watford (gr. Mr. F. A. Steward), for stove and greenhouse plants.

To Lionel de Rothschild, Esq., O.B.E., V.M.H., of Exbury House, Southampton (grs. Messrs. Hanger and Findlay), for Azaleas raised at Exbury.

To Messrs. L. R. Russell, of Windlesham, for stove and greenhouse plants.

To Messrs. J. Waterer, Sons & Crisp, of Bagshot, for Rhododendrons and Azaleas.

To Messrs. Dobbie, of Edinburgh, for Tulips.

To Sir Jeremiah Colman, Bt., V.M.H., of Gatton Park, Reigate (Orchid grower, Mr. B. F. Perfect), for Orchids.

To Lionel de Rothschild, Esq., O.B.E., V.M.H. (Orchid grower, Mr. B. Hills), for Orchids.

To Messrs. Charlesworth, of Haywards Heath, for Orchids.

To Messrs. McBean, of Cooksbridge, for Orchids.

To Messrs. Laxton Bros., of Bedford, for Strawberries.

To Messrs. Sutton, of Reading, for vegetables.

To Messrs. W. A. Constable, of Tunbridge Wells, for Lilies.

To Messrs. Wallace, of Tunbridge Wells, for a mixed group of Lilies, Rhododendrons, Azaleas, Irises and bulbous plants.

To Messrs. Allwood, of Haywards Heath, for Carnations and Pinks.

To Messrs. J. Waterer, Sons & Crisp, of Twyford, for a formal Iris garden.

To Mr. Percy S. Cane, of Cliveden Place, S.W., for a formal garden.

Silver Cups.

To Messrs. Clarence Elliott, of Stevenage, for a rock garden.

To Messrs. The Donard Nursery Co., of Newcastle, Co. Down, for shrubs.

To Messrs. Hollamby's Nurseries, of Groombridge, for Rhododendrons, Azaleas and other shrubs.

To Messrs. G. Jackman, of Woking, for Clematises and Maples.

To Messrs. L. R. Russell, Ltd., of Windlesham, for trees and shrubs including climbers.

To Messrs. Barr, of Covent Garden, for Tulips and bulbous Irises.

To Messrs. J. R. Pearson, of Lowdham, for Tulips.

To F. J. Hanbury, Esq., F.L.S., V.M.H., of Brockhurst, East Grinstead (Orchid grower, Mr. S. Farnes), for Orchids.

To Messrs. H. G. Alexander, of Tetbury, for Orchids.

To Messrs. Armstrong & Brown, of Tunbridge Wells, for Orchids.

To Messrs. Sanders, of St. Albans, for Orchids.

To Messrs. G. Bunyard, of Maidstone, for Apples.

To Messrs. Fogwills, of Guildford, for vegetables.

To Messrs. J. Waterer, Sons & Crisp, of Bagshot, for trees and shrubs.

To Messrs. C. Engelmann, of Saffron Walden, for Carnations.

To Messrs. Wm. Cutbush, of Barnet, for an informal water garden.

To Mr. R. Hancock, of Sloane Street, S.W. 1, for a Tudor walled garden.

cxiv PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

To Mr. James MacDonald, of Harpenden, for a grass garden.

To Messrs. R. Wallace, of Tunbridge Wells, for a garden.

To Messrs. J. Waterer, Sons & Crisp, of Twyford, for a mixed group of herbaceous plants and Lilies.

To Mr. Amos Perry, of Enfield, for a mixed group of Ferns, Tree Paeonies, hardy Orchids and insectivorous plants.

Silver-gilt Flora Medals.

To Messrs. J. Cheal, of Crawley, for trees and shrubs.

To Messrs. Knap Hill Nursery, of Woking, for Azaleas.

To Messrs. John Peed, of West Norwood, for greenhouse plants.

To Messrs. Wakeley, of Bankside, S.E., for Tulips.

To Messrs. Black & Flory, of Slough, for Orchids.

To Mr. Elisha J. Hicks, of Reading, for Roses.

To Messrs. E. Webb, of Stourbridge, for a mixed group of greenhouse plants and annuals.

To Messrs. W. E. Th. Ingwersen, of E. Grinstead, for a rock garden.

To Messrs. Hillier, of Winchester, for an informal garden.

To Mr. G. H. Dalrymple, of Bartley, Southampton, for a mixed group of Primulas and Auriculas.

Silver-Gilt Banksian Medals.

To Messrs. J. C. Allgrove, of Langley, Slough, for a mixed group of shrubs and herbaceous plants.

To Mr. John Klinkert, of Richmond, for topiary.

To Messrs. W. T. Neale, of Worthing, for a mixed group of Cacti, succulents and Gazanias.

To Mr. R. C. Notcutt, of Woodbridge, for shrubs outdoors.

To Mr. R. C. Notcutt, of Woodbridge, for shrubs in tent.

To Messrs. Pennell, of Lincoln, for a mixed group of Clematises and Statice.

To Messrs. G. Reuthe, of Keston, for Rhododendrons and other shrubs.

To W. G. Theobald, Esq., of Wykeham Close, Steyning, Sussex (gr. Mr. R. Baker), for Cotyledons and Echeverias.

To Messrs. Walton Park Nurseries, of Walton-on-Thames, for Rhododendrons, Azaleas and other flowering shrubs.

To Mr. G. G. Whitelegg, of Chislehurst, for Azaleas.

To Messrs. R. H. Bath, of Wisbech, for a mixed group of Tulips and herbaceous plants.

To Messrs. Daniels Bros., of Norwich, for Tulips.

To N. Prinsep, Esq., of Pevensey Bay (gr. Mr. A. Merry), for Orchids.

To Messrs. The Stuart Low Co., of Enfield, for Orchids.

To Messrs. Ben. R. Cant, of The Old Rose Gardens, Colchester, for Roses.

To Messrs. W. Cutbush, of Barnet, for Polyantha Roses.

To Messrs. Dobbie, of Edinburgh, for Antirrhinums.

To Mr. Ian G. Walker, of South Godstone, for a rock garden.

To Messrs. Bedford & Page, of Trumpington, for a rock garden.

To Mr. Granville B. Ellis, of Haymarket, S.W., for a rock garden.

To Messrs. J. Cheal, of Crawley, for a formal garden.

To the Country Gentlemen's Association, of Letchworth, for a formal garden.

To Messrs. Garden Makers, of Baker Street, W., for a formal garden.

To Messrs. J. Burley, of Putney, S.W., for a formal garden.

To Messrs. Kelway, of Langport, for a mixed group of Paeonies, Pyrethrums and Delphiniums.

Silver Flora Medals.

To Messrs. R. Aireton, of Poole, for trees and shrubs.

To Messrs. Baggesen's Nurseries, of Pembury, nr. Tunbridge Wells, for shrubs.

To Messrs. Bakers, of Codsall, for trees and shrubs.

To Messrs. Robert Green, of Crawford Street, W., for Bay trees.

To Messrs. Knap Hill Nursery, of Woking, for Rhododendrons and Lilies.

To Mr. W. J. Marchant, of Wimborne, for trees and shrubs, including Heathers.

To Messrs. L. R. Russell, of Windlesham, for Azaleas and Rhododendrons.

To Messrs. D. Stewart, of Wimborne, for a mixed group of Rhododendrons, Azaleas and other shrubs.

To Messrs. R. Veitch, of Exeter, for trees and shrubs.

To Messrs. The Yokohama Nursery Co., of Kingsway, W.C., for Japanese dwarf trees.

To Messrs. Harry Dixon, of Wandsworth, S.W., for Orchids.

To Messrs. Mansell & Hatcher, of Rawdon, for Orchids.

To Messrs. Allwood, of Haywards Heath, for Border Carnations and Pinks.

To Messrs. Ashington Nurseries, of Ashington, for Carnations.

To Messrs. Frank Cant, of Braiswick Rose Gardens, Colchester, for Polyantha Roses.

To Messrs. Frank Cant, of Braiswick Rose Gardens, Colchester, for Roses.

To Mr. James Douglas, of Gt. Bookham, for Border Carnations.

To Messrs. Napiers, of Taunton, for Carnations.

To Mr. J. Stevenson, of Wimborne, for Sweet Peas.

To Messrs. Toogood, for bulbous plants.

To Messrs. The Stuart Low Co., of Enfield, for Australian shrubs and other greenhouse plants, including *Hippeastrum* hybrids.

To Messrs. Conways, of Halifax, for a rock garden.

To Messrs. Pulham, of Newman Street, W., for a rock garden.

To The Cement & Concrete Association, of Grosvenor Gardens, S.W., for a formal garden.

To Messrs. Bakers, of Codsall, for a mixed group of Delphiniums and Astilbes.

To Messrs. Barr, of Covent Garden, for herbaceous plants.

To Messrs. Carter Page, of London Wall, E.C., for Dahlias.

To Messrs. Dobbie, of Edinburgh, for Dahlias.

To Messrs. C. Engelmann, of Saffron Walden, for Pansies and Sempervivums.

To Messrs. Hewitt, of Stratford-on-Avon, for a mixed group of *Thalictrums*, Delphiniums and Dahlias.

To Messrs. Konynenburg & Mark, of Noordwyk, Holland, for Gladioli.

To Mr. Ernest Ladhams, of Godalming, for a mixed group of shrubs and herbaceous plants.

To Messrs. Orpington Nurseries, of Orpington, for Irises.

To Messrs. M. Prichard, of Christchurch, for Lupins.

To Mr. G. G. Whitelegg, of Chislehurst, for Irises.

To Messrs. William Wood, of Taplow, for herbaceous plants.

To Messrs. Brookside Nurseries, of Headington, for rock garden plants.

To Mr. Amos Perry, of Enfield, for a mixed group of rock garden plants and submerged aquatics.

To Messrs. M. Prichard, of Christchurch, for rock garden plants.

Silver Banksian Medals.

To Messrs. Burkwood & Skipwith, of Kingston-on-Thames, for trees and shrubs.

To Messrs. R. Gill, of Penryn, for Rhododendrons.

To Messrs. S. Smith, of Enfield, for Cacti and succulents.

To Messrs. Henshall, of Matlock Bath, for a rock garden.

To Messrs. The Bronwyfa Fruit and Bulb Farm, of Abergele, for Tulips.

To Lady Carr, of Walton-on-the-Hill (gr. Mr. J. T. Doe), for Carnations.

To Messrs. Chaplin, of Waltham Cross, for Roses.

To Messrs. C. Engelmann, of Saffron Walden, for Gerberas.

To Mr. C. Gregory, of Chilwell, Nottingham, for Roses.

To Mr. H. J. Jones, of Lewisham, for Hydrangeas.

To Messrs. Redgrove & Patrick, of Seale, Sevenoaks, for a rock garden.

To Messrs. J. Robinson, of Eltham, for a rock garden.

To Messrs. H. Hemsley, of Crawley, for an informal garden.

To Mr. S. Kusumoto, of Hendon Way, N.W., for a Japanese garden.

To Messrs. W. Artindale, of Sheffield, for a mixed group of *Eremurus* and Lilies.

To Mr. F. J. Bell, of Whitley Bay, for Pansies and Violas.

To Messrs. G. Bunyard, of Maidstone, for Irises.

To Messrs. Clark, of Dover, for a mixed group of herbaceous and bulbous plants.

To Mr. G. R. Downer, of Chichester, for Lupins.

To Mr. Stuart Ogg, of Swanley, for Dahlias.

To Mr. J. B. Riding, of Chingford, E., for Dahlias.

To Mr. T. Simmons, of Ballards Lane, N., for Violas.

To Messrs. Suffolk Seed Stores, of Woodbridge, for herbaceous plants.

To Messrs. Hocker Edge Gardens, of Cranbrook, for rock garden plants.

To Messrs. W. E. Th. Ingwersen, of East Grinstead, for rock garden plants.

To Mr. Ernest Ladhams, of Godalming, for rock garden plants.

To Mr. G. E. Welch, of Cambridge, for rock garden plants.

Silver Hogg Medal.

To Messrs. T. Rivers, of Sawbridgeworth, for fruit trees in pots.

Flora Medals.

To Messrs. W. G. Haskins, of Bournemouth West, for Clematises and other shrubs.

To Mr. L. Lawrence, of Taplow, for Cacti and succulents.

cxvi PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

- To Messrs. John Scott, of Marriott, for shrubs.
- To Mr. R. Colpoys Wood, of West Drayton, for shrubs.
- To Messrs. T. Yano, of Granville Place, W., for Japanese dwarf trees.
- To Mr. A. Dawkins, of King's Road, Chelsea, for *Schizanthus* hybrids.
- To Mr. F. Everitt, of Enfield Lock, for greenhouse plants.
- To Messrs. Laxton Bros. (Bedford), of Bedford, for Roses.
- To Messrs. The Stuart Low Co., of Enfield, for Carnations.
- To Messrs. D. Prior, of Colchester, for Roses.
- To Messrs. R. Tucker, of Faringdon, for Roses.
- To Messrs. Watkins & Simpson, of Drury Lane, W.C., for a mixed group of Stocks, Ranunculuses and Nierembergias.
- To Mr. E. Clegg, of Dewsbury, for a mixed group of Dahlias and Violas.
- To Mr. J. F. Cumming, of Wisbech, for Pyrethrums, Trolliuses and other herbaceous plants.
- To Messrs. The Highfield Nursery Co., of Enfield, for Violas.
- To Messrs. Redgrove & Patrick, of Seale, Sevenoaks, for herbaceous plants.
- To Mr. T. Robinson, of Nottingham, for Dwarf Dahlias.
- To Messrs. J. F. Spencer, of Hockley, for Dahlias.
- To Mr. William Yandell, of Maidenhead, for Violas.
- To Messrs. Alpine Nurseries, of Wimborne, for rock garden plants.
- To Mr. Ernest Ballard, of Colwall, for Ramondias and other rock garden plants.
- To Messrs. Bedford & Page, of Trumpington, for trough gardens.
- To Messrs. Bowell & Skarratt, of Cheltenham, for rock garden plants.
- To Messrs. The Dartington Hall, of Totnes, for rock garden and bog plants.
- To Messrs. Oliver & Hunter, of Moniaive, for a mixed group of rock garden plants and Lilies.
- To Messrs. J. Waterer, Sons & Crisp, of Twyford, for rock garden plants.
- To Mr. W. Wells, junr., of Merstham, for rock garden plants.
- To Messrs. William Wood, of Taplow, for rock garden plants.

(To be continued.)

EXTRACTS FROM THE PROCEEDINGS

OF THE

ROYAL HORTICULTURAL SOCIETY.

NOTICES TO FELLOWS.

SUBSCRIPTIONS.

Fellows are reminded that anyone joining the Society after July 1 and before October 1 will be required to pay only a half-year's subscription, and will receive the monthly Journal commencing with the July number. Those joining after October 1 and before January 1 pay a full year's subscription, which entitles them to all the privileges of Fellowship until January 1, 1939. Back numbers of the Journal are always obtainable by Fellows at *9d.* a number.

GREAT AUTUMN FLOWER SHOW.

The Great Autumn Flower Show is again being held in the National Hall, Olympia, on *September 29, 30, and October 1*. Next in importance to the Spring Show at Chelsea, this Great Autumn Show affords a wonderful opportunity for gathering together all the beautiful flowers and plants which make autumn brilliant with their colours, and Fellows are recommended to make a special effort to visit this Show, not only to enjoy the spectacle, but also to consider the matter of restocking their gardens during the coming planting season.

Particulars of the hours of admission to the Show are given below, and they are also printed on the back of Fellows' tickets.

September 29, 11 A.M. to 9.30 P.M.

September 30, 10 A.M. to 9.30 P.M.

October 1, 10 A.M. to 5 P.M.

The prices of admission for non-Fellows are :

	<i>s.</i>	<i>d.</i>
<i>September 29.</i> —11 A.M. to 2 P.M. . . .	10	0
2 P.M. to 6 P.M.	5	0
6 P.M. to 9.30 P.M.	2	6
<i>September 30.</i> —10 A.M. to 6 P.M. . . .	2	6
6 P.M. to 9.30 P.M.	1	0
<i>October 1.</i> —10 A.M. to 5 P.M.	1	0

Two Challenge Cups will be competed for at the Autumn Show : the Coronation Cup, which is offered for the best exhibit at the Show, and the Wigan Cup, which is offered for the best exhibit of Roses. Special entry forms for these competitions are given in the Schedule, which will be sent on application to the Secretary.

CONFERENCE ON FLOWERING TREES AND SHRUBS.

Further details of the Conference on Flowering Trees and Shrubs (other than Rhododendrons) which is to be held next year on *April 26, 27 and 28* have now been determined, and the following programme of papers has been drafted :

Tuesday, April 26, 1938. Session, 3-5 P.M.

Introductory Address by the President.

Arrangement of Flowering Trees and Shrubs, including their Use on Walls, Rock Gardens, etc.

cxviii PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

Wednesday, April 27, 1938. Morning Session, 11 A.M.—1 P.M.

Cherries, Crabs and their Allies.
Broom and Cistus Families.

Wednesday, April 27, 1938. Afternoon Session, 2.30—5 P.M.

Cotoneasters, Viburnums and Berberis.
Lilacs, Philadelphus, Deutzias, Hibiscus and Escallonia.

Thursday, April 28, 1938. Morning Session, 11 A.M.—1 P.M.

Flowering Trees and Shrubs for various climates and soils; Preparation for
Planting and Selection of Kinds.
Other Families of Flowering Trees and Shrubs.

Thursday, April 28, 1938. Afternoon Session, 2.30—5 P.M.

Magnolias and Camellias.
Propagation and Pruning.

In connexion with the Conference there will be a Show at which exhibits of flowering trees and shrubs will be a special feature, and it is hoped to collect from private and other sources specimens of rare shrubs.

Fellows who are particularly interested in the class of plants dealt with in this Conference are asked to notify the Secretary, so that they may be kept informed of the arrangements being made in connexion with the Conference, and so that an estimate may be made of the number of advance copies of the papers which will be required.

As further details become available they will be published in these Notices.

HORTICULTURAL COLOUR CHART.

Owing to the vast amount of work involved in the compilation of the Horticultural Colour Chart it has not been possible to publish it as soon as had been anticipated. The work on the Chart is, however, progressing, and the first volume will appear at the earliest possible moment.

Anyone desiring further particulars about this Chart is asked to write to the Secretary. Applications for the first volume at the price of 10s. a copy, exclusive of postage, will be accepted up to the date of publication. After publication copies will only be available at that price until the Society's limited stock is exhausted, when the price will be £1 1s. 6d. a copy.

CALENDAR.

August 4 (Wednesday), 12 noon to 6 P.M.—Fortnightly Meeting and Show of Flowers in season.

August 17, 12 noon to 6 P.M.—Fortnightly Meeting and Show of Flowers in season. On this occasion the Foremarke Cup will be offered for award to Gladioli. See p. cxix.

At 3.30 P.M., in the Lecture Room of the New Hall, on *August 17*, Mr. D. E. Green, M.Sc., will lecture on "Control of Antirrhinum Rust."

August 17, 1 to 7.30 P.M., and August 18, 10 A.M. to 5 P.M.—British Gladiolus Society's Show in the Old Hall.

August 25 and 26, 2 P.M. to 4 P.M.—Practical Demonstration at Wisley on "Vegetative Propagation of Plants." See p. cxix.

August 31, 12 noon to 6 P.M.—Fortnightly Meeting and Show of Flowers in season.

At 3.30 P.M. in the Lecture Room of the New Hall, on *August 31*, Mrs. V. Higgins, M.A., will lecture on "Desert Plants."

September 4, 2.30 P.M. to 8 P.M.—London Allotments and Gardens Show Society hold their exhibition in the New Hall.

September 7, 12 noon to 7.30 P.M.—National Dahlia Society's Show in the New Hall.

September 7, 1 to 7.30 P.M.—Alpine Garden Society's Show in the Old Hall.

September 8, 10 A.M. to 5 P.M.—National Dahlia Society's Show and the Alpine Garden Society's Show, continued.

September 10, 12 noon to 7 P.M.—National Rose Society's Show in both Halls.

September 11, 11 A.M. to 5 P.M.—National Rose Society's Show, continued.

September 14, 12 noon to 6 P.M.—Fortnightly Meeting and Show of Flowers in season. On this occasion a Silver Trophy will be offered for award for Cacti and Succulents, and two Sewell Medals for rock garden or alpine house plants. See p. cxix.

September 29, 30, and October 1.—Great Autumn Show in the National Hall, Olympia, W. 14. See special notice, p. cxvii.

HALL LETTINGS.

From *September 1* to *4* there will be a Honey Show in the Old Hall. Any Fellow interested in such a show is invited to write to the organizer, W. E. Hamlin, Esq., at 3 St. Mark's Place, Wimbledon, S.W. 19, for fuller particulars.

FOREMARKE CUP FOR GLADIOLI.

At the Fortnightly Show on *August 17* the Foremarke Challenge Cup will be offered for award to trade and amateur growers for an exhibit of twenty spikes of named Gladioli in not less than ten varieties, and not more than two spikes of any one variety. Entries should be made on special forms obtainable from the Secretary, by whom the completed forms should be received not later than by the first post on Wednesday, *August 11*.

PRACTICAL DEMONSTRATION AT WISLEY.

A demonstration on the Vegetative Propagation of Plants will be given at Wisley on *August 25* and *26* from 2 P.M. to 4 P.M., weather permitting. Fellows who intend to be present at this demonstration are asked to inform the Director, R.H.S. Gardens, Wisley, Ripley, Surrey, beforehand, mentioning on which day they will attend, in order that adequate arrangements may be made.

SILVER TROPHY FOR CACTI AND SUCCULENTS.

A Silver Trophy, provided from Mrs. Sherman Hoyt's Prize Fund, is offered for award at the Fortnightly Show on *September 14* for the best group of Cacti and/or Succulents staged by an amateur. Entries should be made on special forms obtainable from the Secretary, by whom the completed forms should be received not later than by the first post on Wednesday, *September 8*.

SEWELL MEDAL COMPETITION.

At the Fortnightly Show on *September 14* the last Sewell Medal Competition of the year will take place. This Medal, which is struck in Gold, is awarded for exhibits of plants suitable for the rock garden or alpine house, and on this occasion one medal is offered for an amateur's exhibit and one for a horticultural trader's. Each amateur's exhibit must consist of three, and each horticultural trader's of six, pots or pans not exceeding 12 inches in diameter if circular, or 112 square inches in internal area if rectangular, and only one subject should be shown in each pot or pan. It is not necessary that the plants should have been grown in the receptacles in which they are shown and, if desired, plants may be lifted and potted for the purposes of the competition. Not fewer than two-thirds of the plants in each exhibit must be in bloom, and plants which are not in bloom should possess decorative value when shown. The scale of points for judging will be as follows: Suitability, 24 points; Rarity, 18 points; Cultivation, 24 points. Entries should be made on special forms which are obtainable from the Secretary, by whom the completed forms must be received not later than by the first post on Wednesday, *September 8*.

THE GARDENS AT BODNANT.

Fellows visiting North Wales will be glad to know that the Gardens at Bodnant, Tal-y-Cafn, North Wales, are, by Lord Aberconway's permission, open to Fellows of the Society without charge on Tuesday and Friday afternoons throughout the summer from 2 to 5 P.M.

EXAMINATIONS.

British Floral Art Diploma.

Intending candidates are reminded that entries for the Autumn Examination close on Wednesday, *September 1*, 1937. The syllabus and entry form may be obtained from the Society's offices on application.

Horticultural Examinations.

General Examination.—There was a slight increase in the number of entries for the Society's General Examination for Seniors and Juniors, and also for the Teachers' Preliminary Examination. In the General Senior Examination for candidates over eighteen, 343 candidates have been awarded Certificates and a

CXX PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

Silver-gilt Medal has been won by Mr. Thomas Laffin of the John Innes Horticultural Institution, Merton Park, who was First. In the Junior section, a Silver Medal was awarded to Mr. Joseph Vincent Green of the Midland Agricultural College, Sutton Bonington, who was First, and 117 Certificates were awarded to successful candidates.

Teachers' Preliminary Examination.—Three hundred and sixty-eight candidates entered for the Teachers' Preliminary Examination and Certificates were awarded to 259 successful candidates. A Silver-gilt Medal was awarded to Miss Mary Gatecliff, of Studley College, Warwickshire, who was First.

Teachers' Advanced Examination.—Thirty-three candidates entered for the Teachers' Advanced Examination, but with a few exceptions the standard fell short of that of recent years, and Certificates were awarded to ten candidates only. Their names were as follows :—

Pass with Honours.

GUTSELL, RAYMOND JOHN, Jeanette, Thorpe End Estate, Gt. Plumstead, Norwich.

Pass.

CHANDLER, PHILIP ARTHUR, 14 Halford Road, Richmond, Surrey.
GARLEY, DAVID LANGTON, Bridge Cottage, Whimble, Devon.
HUME, WILLIAM GOODALL, 132 Evans Lane, Kidlington, Oxford.
KAYE, Miss LILLIAN, Burn Farm, Birchcliffe, Huddersfield.
LEWIS, WILLIAM HERBERT, Upper Prescoed Farm, Llanbadoc, Usk.
PAGE, ROBERT WILLIAM, Hill Farm, Halesworth, Suffolk.
PHILLIPS, HORACE JOHN, c/o Miss Boyles, Gt. Haseley, Oxford.
THORNTON, Miss MARY CLARKE, 5 Goldney Avenue, Clifton, Bristol.
WILDY, RONALD HASKELL, 38 Bushwood Road, Kew Green, Surrey.

National Diploma in Horticulture.—The National Diploma in Horticulture has been awarded to the following as a result of the written and practical examinations held this year :—

Section 1. General Horticulture.

BROWN, GEOFFREY, Cold Arbor, Pyrford, Woking.
CHANDLER, PHILIP A., 14 Halford Road, Richmond, Surrey.
GOLDSACK, FRANCIS G., c/o Royal Botanic Gardens, Kew, Surrey.
GOODLIFFE, SYDNEY A., 17 Rye Street, Bishops Stortford.
GOODSHIP, GEORGE T., Helford House, Drayton Rd., Boreham Wood.
KEMP, RONALD W., c/o The University, Reading.
POWELL, AUBREY G. C., Wharf Cottage, Sampford Peverell, nr. Tiverton.
TWYMAN, REGINALD C., The Gardens, Quarry Wood, Burghclere.
WARD, HUBERT J., Somerset Farm Institute, Cannington, Bridgwater.

Section 6. Gardening in Public Parks.

DYER, PERCY, 97 Newcomen Street, Hull.
DYSON, RONALD C., 103 Stanford Avenue, Brighton.
HEALEY, AUSTIN G., 145 Havelock Road, Brighton.

Thirty candidates have also passed the Preliminary Examination for the Diploma and will be eligible to take the Final Examination on completion of six years of practical gardening.

The practical examinations for these Certificates and Diplomas took place in the Society's Gardens, Wisley, in June.

Examinations, 1938.

The syllabus giving the entry forms and dates for the 1938 Examinations will be available in August, and may be had on application to the Society's Offices.

WHITE FLY PARASITE.

Where the parasite of the greenhouse white fly, *Encarsia formosa*, has been introduced, it has proved extremely effective in checking the increase of this pest under glass, and large numbers have been distributed during the past few years. The demand has become so great that, in order to meet in a measure the cost of maintaining the parasite over the difficult winter months and packing and despatching it, the Council has fixed a charge of 2s. 6d. for a supply for a small house and 5s. for a large house, and applications for it should be accompanied by the sum named. It is useless to introduce it to houses until the average temperature is about 70° F. It is hoped that Fellows who have found it successful will distribute it in their neighbourhood.

Applications with the appropriate sum of money should be sent to THE DIRECTOR, R.H.S. Gardens, Wisley, Ripley, Surrey.

INSPECTION OF GARDENS.

Many Fellows may not be aware of the terms under which their gardens can be inspected by the Society's Garden Inspector, and advice given thereon. They are set out below, and it will be seen that special arrangements can be made when Fellows living in the same district co-operate.

"The inspection of Gardens belonging to Fellows is conducted by a thoroughly competent Inspector from the Society who reports and advises at the following cost, viz.: a fee of £3 3s. for one day, or £5 5s. for two consecutive days, together with all out-of-pocket expenses. No inspection may occupy more than two days, save by special arrangement. Should two or more Fellows residing in the same district, with their gardens within easy reach of one another, desire to have the services of the Garden Inspector, arrangements will be made for such a combined inspection and the fee and expenses divided by consent of those concerned. Fellows wishing for the services of an Inspector are requested to give at least a week's notice and choice of two or three days, and to indicate the most convenient railway station and its distance from their Garden. Gardens can only be inspected at the written request of the owner."

WISLEY IN AUGUST.

The Trials and Collections, now at their best, include Early Double China Asters, Bedding Lobelias, Annual Carnations, new Gladioli, Montbretias and Dahlias; the early varieties of *Aster Amellus* will be found near these, while the borders of Roses and annual flowers lead up the hill towards the Alpine house. In a bed beside the Alpine house the Gazanias continue to open their brilliant flowers on sunny days throughout this month, while a notably attractive shrub on the wall of the house is the hybrid *Caryopteris* × *clandonensis* with rich blue flowers. On the rock garden a few plants worthy of special mention are the Gentians now starting their late summer and autumn season, of which the species *Farreri*, *Veitchiorum*, and *sino-ornata* var. *praecox* are examples, the *Cyananthus* in cool corners, the curious Orchid-like *Roscoea*, and the prostrate *Anagallis collina* and *Verbena chamaedryfolia* of glowing red or scarlet hues.

Wild Garden.—Here are at least three items to draw the attention of visitors. First, the several species of Lilies, including the tall North American *Lilium superbum*, a lover of swampy places, the orange-yellow or orange-red *L. Henryi* and *L. tigrinum* and the dwarf *L. formosanum* from eastern Asia. Secondly, the graceful Willow Gentian of herbaceous character, growing about two feet high, and thirdly, that lovely shrub so valuable both for its late flowers and autumnal colouring of foliage, *Eucryphia glutinosa* (*pinnatifolia*). Besides these the hybrid Astilbes and the Flame Flower (*Tropaeolum speciosum*) grow and flower freely here in the rich woodland soil, and the latter may also be seen on the shady wall of the Superintendent's house at the entrance to the Gardens.

Seven Acres.—In this part there are a few notable shrubs in bloom, although it is late in the season for them. They include the bushy Chestnut from the south-eastern U.S.A., *Aesculus parviflora*, besides Buddleias, Escallonias, the useful *Hypericum patulum* and a rather uncommon evergreen allied to the Privets and Lilacs, *Parasyringa sempervirens*. The brightest section here, however, is the Heath garden, where the Connemara, Cross-leaved, and Bell Heathers produce their quantities of rose-red, carmine or white flowers. The tall late-blooming *Genista aethnensis* from Sicily still hangs its scented yellow tassels among them.

Herbaceous Border.—One of the chief features to attract the visitor this month is the herbaceous border, now to be seen at its best, in which grow a great number of suitable plants, including many of the most up-to-date varieties.

Greenhouses.—In the large temperate house two fine shrubs now in bloom are *Solanum Wendlandii*—a giant of the Potato family—and *Plumbago capensis*; the Morning-Glory (*Ipomoea Learii*) trained on one of the supports should still be displaying some of its rich purplish-blue trumpets, whilst the species and hybrids of Fuchsia continue to produce a varied assortment of red, scarlet, rose or vermilion flowers. In the first or half-hardy house are several brightly coloured Pelargoniums and Mesembryanthemums, together with the tall, downy-leaved *Calceolaria Pavonii* with the yellow flowers typical of its race, besides a variety of other plants which enjoy these surroundings.

GENERAL MEETINGS.

CHelsea Show.

MAY 26, 27 AND 28, 1937.

Held in the Grounds of the Royal Hospital, Chelsea.

LIST OF AWARDS (*cont.*).

Banksian Medals.

To Messrs. H. Prins, of Wisbech, for a mixed group of Tulips, Daffodils and Hyacinths.

To Mr. F. A. Greenfield, of Horsham, for Orchids.

To Mr. F. C. Biddlecombe, of St. Margarets-on-Thames, for Carnations.

To Mr. H. A. Brown, of South Chingford, for Fuchsias.

To Messrs. G. Bunyard, of Maidstone, for Roses.

To The Misses Cadell, of Longniddry, East Lothian, for Roses.

To Mr. R. J. Case, of Taunton, for zonal Pelargoniums.

To Mr. James Douglas, of Gt. Bookham, for Auriculas.

To Messrs. W. Easlea, of Leigh-on-Sea, for Roses.

To Messrs. C. Engelmann, of Saffron Walden, for Zinnias.

To Mr. Douglas Foxwell, of Balcombe, for Antirrhinums.

To Messrs. Gurteen & Ritson, of Three Bridges, for Polyantha Roses.

To Messrs. Jarman, of Chard, for Roses.

To Mr. E. B. Le Grice, of North Walsham, for Roses.

To Mr. F. Ley, of Windlesham, for Polyantha Roses.

To Messrs. Wm. Lowe, of Beeston, Notts, for Roses.

To Messrs. J. R. Pearson, of Lowdham, Notts, for *Schizanthus* hybrids.

To Messrs. Ryder, of St. Albans, for flowering plants and seeds.

To Studley College, Warwickshire, for Cinerarias.

To Swanley College, Swanley, for greenhouse plants.

To Messrs. C. Wall, of Bath, for Aquilegias.

To Messrs. Wheatcroft, of Ruddington, Notts, for Roses.

To Messrs. Wood & Ingram, of Huntingdon, for Roses.

To Messrs. The Colesbourne Gardens, of Colesbourne, for a mixed group of bulbous and herbaceous plants.

To Messrs. Gibson, of Cranleigh, for a mixed group of Dahlias, Irises and Pinks.

To Mr. H. G. Longford, of Abingdon, for a mixed group of herbaceous and rock garden plants.

To Mr. A. Miles, of Bickley, for a mixed group of shrubs, Dahlias, herbaceous and rock garden plants.

To Mr. Amos Perry, of Enfield, for a mixed group of Irises and other herbaceous and bulbous plants.

To Messrs. M. Prichard, of Christchurch, for herbaceous plants.

To Mr. F. Rich, of Worcester, for herbaceous plants.

To Messrs. Bakers, of Codsall, for rock garden plants.

To Messrs. Bedford & Page, of Trumpington, for rock garden plants.

To Mrs. G. Buxton, of Theydon Bois, for Primulas.

To The Misses Cadell, of Longniddry, East Lothian, for rock garden plants.

To Messrs. The Chez-Nous Nurseries, of Newick, for rock garden plants.

To Messrs. G. Clark, of Dover, for rock garden plants.

To Messrs. Clarence Elliott, of Stevenage, for trough gardens.

To Messrs. John Forbes, of Hawick, for a mixed group of herbaceous and rock garden plants.

To Messrs. G. Gibson, of Leeming Bar, for a mixed group of Conifers, Iceland Poppies and rock garden plants.

To Mr. A. Hansen, of New Barnet, for a mixed group of *Sempervivums* and Lupins.

To Messrs. Hillier, of Winchester, for dwarf trees and shrubs and other rock garden plants.

To Mr. R. Kaye, of Silverdale, for rock garden plants.

To Messrs. Maxwell & Beale, of Broadstone, for rock garden plants.

To Mrs. H. A. Milford, of Chedworth, for rock garden plants.

To Messrs. G. Renthe, of Keston, for rock garden plants.

To Messrs. J. Robinson, of Eltham, for rock garden plants.
 To Mr. R. V. Roger, of Pickering, for rock garden plants.
 To Messrs. W. H. Rogers, of Bassett, Southampton, for rock garden plants.
 To Messrs. L. R. Russell, of Windlesham, for rock garden plants.
 To Mr. G. E. P. Wood, of Ashted, for rock garden plants.

JUNE 8, 1937.

COMPETITIVE CLASSES FOR AMATEURS.

Hardy Shrubs.

CLASS A. 8 vases of hardy shrubs, 8 varieties.

First Prize, 60s.

To Colonel Stephenson R. Clarke, C.B., Haywards Heath.

Second Prize, 45s.

To Rt. Hon. Lord Swaythling, Southampton.

Third Prize, 30s.

To Admiral A. Walker-Heneage-Vivian, C.B., Clyne Castle, Swansea.

CLASS B. 1 vase of a hardy shrub.

First Prize, 20s.

To Admiral A. Walker-Heneage-Vivian, C.B.

Second Prize, 15s.

To Rt. Hon. Lord Swaythling.

Third Prize, 10s.

To Lady Lawrence, Dorking.

SEWELL MEDAL COMPETITION.

The Sewell Medal for the best exhibit of three pots or pans of plants suitable for the rock garden or alpine house, shown by an amateur, was awarded to Mark Fenwick, Esq., Abbottswood, Stow-on-the-Wold.

SCIENTIFIC COMMITTEE.—Mr. E. A. BOWLES, M.A., F.L.S., F.R.E.S., V.M.H., in the Chair, and seven other members present.

The late Mr. William Hales, A.L.S., V.M.H.—The Committee learned with great regret of the sudden death of Mr. W. Hales at Chelsea on May 11. Mr. Hales had been a member of the Committee for many years and had rendered much help to the Society both on this Committee and in connexion with the Society's examinations.

Fossil wood.—Dr. Barnes reported on the fossil wood shown by Mr. Bowles on March 23 and said that it was coniferous, but the state of preservation was not sufficiently good to allow of satisfactory microscopic preparations to be made. Mr. W. N. Edwards of the Natural History Museum, who had seen the specimen, suggested that the wood was probably that of *Araucarites*, and had probably come from the Portlandian measures in Dorset, whence much silicified wood was brought many years ago and used on rockeries. Dr. Barnes showed a number of pulls and slides of fossil plants from the Lower Carboniferous and the Coal Measures.

Albino Butterfly Orchid.—Mr. Percy Bunyard sent the Butterfly Orchid, *Platanthera bifolia*, of normal form and an albino variety which he had collected in Surrey. The foliage as well as the flowers showed the lack of pigment.

Swellings on roots of Honesty.—Mr. Hosking at a recent meeting showed roots of Honesty with swellings as though attacked by Club-root. These had been examined at Wisley and were found to be structurally similar to the swollen hypocotyl of the radish and turnip. No trace of the organism of Club-root was found.

FRUIT AND VEGETABLE COMMITTEE.—Mr. E. A. BUNYARD, F.L.S., in the Chair, and seven other members present.

Exhibit.

Mr. N. S. Holland, Saxbys, Cowden, Kent : Melon 'Coronation.'

FLORAL COMMITTEE A.—Mr. J. M. BRIDGEFORD in the Chair, and fifteen other members present.

Awards Recommended :—

Gold Medal.

To Messrs. Baker, Wolverhampton, for Lupins.

Silver-gilt Banksian Medal.

To Messrs. Bolton, Birdbrook, for Sweet Peas.

To Messrs. Waterer, Sons & Crisp, Twyford, for Irises.

Silver Flora Medal.

To Messrs. Barr, Taplow, for Irises and Lupins.

To Messrs. Blackmore & Langdon, Bath, for Delphiniums and Irises.

To Messrs. Hewitt, Stratford-on-Avon, for Lupins.

To Messrs. Kelway, Langport, for Pæonies.

To Mr. E. Ladhams, Elstead, for herbaceous plants.

To Rev. Canon Rollo Meyer, Little Gaddesden, for Irises.

To Orpington Nurseries, Orpington, for Irises.

To Messrs. W. H. Simpson, Birmingham, for Lupins.

To Suffolk Seed Stores, Woodbridge, for herbaceous plants.

Silver Banksian Medal.

To Messrs. Bunyard, Maidstone, for Irises.

To Messrs. Dobbie, Edinburgh, for Dahlias.

To Mr. G. R. Downer, Chichester, for Lupins.

To Messrs. Engelmann, Saffron Walden, for Carnations, Zinnias, etc.

To Messrs. Low, Enfield, for Carnations and other greenhouse plants.

To Messrs. Prichard, Christchurch, for Lupins and other herbaceous plants.

To Messrs. Wallace, Tunbridge Wells, for Irises.

Flora Medal.

To Messrs. Wakeley, London, for Irises.

To Mr. G. G. Whitelegg, Chislehurst, for Irises.

Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations and Pinks.

To Messrs. Gibson, Cranleigh, for Irises.

To Messrs. Harkness, Leeming Bar, for Lupins.

To Messrs. Perry, Enfield, for Irises.

To Messrs. Redgrove & Patrick, Sevenoaks, for herbaceous plants.

To Mr. R. V. Roger, Pickering, for Lupins.

To Messrs. Stewart, Ferndown, for herbaceous plants.

Award of Merit.

To *Begonia pendula* 'Scarlet Glow' as a greenhouse pot plant (votes unanimous), from Messrs. Blackmore & Langdon, Bath. See p. 370.

Selected for Trial at Wisley.

Pyrethrum 'Jubilee Gem,' from Messrs. Harkness, Leeming Bar.

Tradescantia alba

azurea

'J. C. Weguelin'

'Leonora'

'Lilac Time'

'Paulinae'

} from Messrs. Prichard, Christchurch.

The following awards were recommended after trial at Wisley (see pp. 371-2).

Award of Merit.

To *Lupinus polyphyllus* 'Cavalier,' from Messrs. W. H. Simpson, Birmingham.

To *Lupinus polyphyllus* 'Delightful,' from Messrs. W. H. Simpson.

To *Lupinus polyphyllus* 'Eileen Reave,' from Mr. J. T. West, Brentwood.

To *Lupinus polyphyllus* 'Jean Smith,' from Messrs. W. H. Simpson.

To *Lupinus polyphyllus* 'La France,' from Messrs. W. H. Simpson.

To *Lupinus polyphyllus* 'Monster,' from Messrs. W. H. Simpson.

To *Lupinus polyphyllus* 'Robert Wood,' from Messrs. W. H. Simpson.

To *Lupinus polyphyllus* 'Sunkist,' from Messrs. W. H. Simpson.

To *Lupinus polyphyllus* 'Windsor Lad,' from Messrs. W. H. Simpson.

Highly Commended.

To *Lupinus polyphyllus* 'Lavender Bee,' from Messrs. R. H. Bath, Wisbech.

To *Lupinus polyphyllus* 'Maize Queen,' from Messrs. W. H. Simpson.

Other Exhibits.

Mr. Booth : Irises.

Mrs. F. E. Dawkins, Little Baddow : *Lupinus arboreus* 'Baddow Blue.'

Mr. D. Foxwell, Balcombe : *Antirrhinum* 'Foxwell.'

Messrs. Gibson, Cranleigh : Lupins.
 Mr. C. A. Jardine, Feltham : Rose 'Royalty.'
 Messrs. Kelway, Langport : Peony 'Kelway's Majestic.'
 Mr. A. C. B. Ker, New Haw : Roses.
 Mr. F. J. Lansdell, Brighton : *Anchusa italica* 'Lansdell's Blue,' and *Papaver orientale* hybrid (to be seen again).
 Mr. W. Nicholls, Coventry : Pelargonium 'Grenadier.'
 Mr. G. Palmer, Birmingham : Pyrethrums.
 Mrs. E. Squires, Christchurch : Delphinium.
 Miss E. Townsend, Emsworth : seedling Delphiniums and Lupins.
 Walton Park Nurseries, Walton-on-Thames : herbaceous plants.

FLORAL COMMITTEE B.—Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and twelve other members present.

Awards Recommended :—

Silver Flora Medal.

To Messrs. Constable, Southborough, for Lilies.

Silver Banksian Medal.

To Messrs. Hillier, Winchester, for flowering shrubs and hardy plants.

To Hocker Edge Gardens, Cranbrook, for shrubs, Lilies and other plants.

Flora Medal.

To Messrs. Prichard, Christchurch, for rock garden plants.

To Messrs. Russell, Windlesham, for flowering shrubs and Maples.

Banksian Medal.

To Messrs. Burkwood & Skipwith, Kingston, for flowering shrubs.

To Messrs. Fielden & Crouch, Wrotham, for rock garden plants.

To Messrs. Garway, London, W. 1, for succulents.

To Messrs. Rogers, Southampton, for rock garden plants.

Award of Merit.

To *Genista lydia* as a hardy flowering shrub (votes 8 for, 1 against), from the Director, R.H.S. Gardens, Wisley. See p. 371.

Preliminary Commendation.

To *Centaurea hypoleuca* as a hardy flowering plant (votes unanimous), from Collingwood Ingram, Esq., Benenden.

To *Senecio glastifolius* as a tender biennial flowering plant (votes unanimous), from Admiral A. Walker-Heneage-Vivian, C.B., Clyne Castle, Swansea.

Cultural Commendation.

To Mr. J. Wilson, gardener to the Rt. Hon. Sir Philip Sassoon, Bt., Trent Park, Barnet, for exceptionally fine cut specimens of *Lilium rubellum*.

To Sir George Manners, Little Haddon Hall, Woodbridge, for a plant of *Musa coccinea*.

Selected for Trial at Wisley.

Clematis 'Silver Queen,' C. 'Lasurstern,' both sent by Mr. Ernest Markham, Gravetye, East Grinstead.

Lavandula Stoechas, Riff Mountains form, sent by Collingwood Ingram, Esq.

Other Exhibits.

Lord Aberconway, Bodnant : *Nomocharis Henrici*.

F. H. A. Booth, Esq., Chiddingfold : *Sollya Drummondii*, *Theropogon pallidus*.

Messrs. Cheal, Crawley : *Robinia Kelseyi*.

Col. Stephenson R. Clarke, C.B., Haywards Heath : *Fraxinus Mariestii*,

Lonicera arizonica, *Magnolia globosa* var. *tsarongensis*.

Messrs. Constable, Southborough : *Sandersonia aurantiaca*, *Lilium* 'Douglas Ingram.'

Mr. A. Corderoy, Eltham : rock garden plants.

Miss Hilda Cyriax, Gt. Missenden : *Potentilla* sp.

Miss Hopkins, Coulsdon : rock garden plants.

A. T. Johnson, Esq., Conway : *Corokia macrocarpa*.

Lady Lawrence, Dorking : *Marica caerulea*.

Messrs. Neale, Worthing : *Gazania* and *Mesembryanthemums*.

Messrs. Prichard, Christchurch : *Salvia Bulleyana*.

Major F. C. Stern, M.C., Goring-by-Sea : *Rosa Rubus*.

The Director, R.H.S. Gardens, Wisley : *Rosa Moyesii* var. 'Geranium,' *Nivembergia caerulea* var. 'Wisley Purple.'

Mr. R. Colpoys Wood, West Drayton : flowering shrubs.

ORCHID COMMITTEE.—Sir JEREMIAH COLMAN, Bart., in the Chair, and sixteen other members present.

Award Recommended :—

Cultural Commendation.

To Mr. A. Everest, gr. to E. R. Ashton, Esq., Broadlands, Camden Park, Tunbridge Wells, for *Coeloglyne Dayana*, with 13 many-flowered pendulous racemes.

Other Exhibits.

Messrs. Charlesworth, Haywards Heath : a group of Orchids.

Messrs. Sanders, St. Albans : a group of Orchids.

Messrs. Stuart Low, Jarvisbrook : a group of Orchids.

Messrs. J. & A. McBean, Cooksbridge : a group of Orchids.

Sir Jeremiah Colman, Bart., Gatton Park, Reigate : *Dendrobium Macarthuriae* var. 'Dr. E. Soysa.'

H. S. Wharton, Esq., Shalstone, Hampstead : *Odontoglossum* × 'Mercurians.'

N. Prinsep, Esq., The Boxes, Pevensey : *Odontoglossum crispum*, Prinsep's var.

JOINT IRIS COMMITTEE. Iris Society's Show.—Major F. C. STERN in the Chair, and twelve other members present.

Award of Merit.

Iris chrysographes var. *rubella* (votes 9 for), shown by Major F. C. Stern, Highdown, Goring-by-Sea. See p. 371.

Selected for Trial at Wisley.

Irises 'Southern Heights,' 'Shiddan,' 'Aden,' and 'Montserrat,' shown by G. L. Pilkington, Esq., Lower Lee, Woolton, Liverpool.

Irises 'Celestiale' and 'White Sentinel,' shown by F. W. Tomalin, Esq., Gloucester Road, Hampton.

Irises 'Khoosroo,' 'Violet Bonnet,' and 'Fleur d'Amour,' shown by G. P. Baker, Esq., Hillside, Sevenoaks, Kent.

Iris 'Joycelle,' shown by F. Wynn Hellings, Esq., Grove Way, Esher.

Iris 'Reflections,' shown by F. Burton, Esq., The Barley House, Hildenborough.

Other Exhibits.

L. Harrison, Esq., Keld, Queenhill Road, Selsdon, Surrey : Iris 'Zebra.'

F. W. Tomalin, Esq. : Irises 'Dusky Chief,' 'Purple Glory,' 'Red Gauntlet,' 'Golden Chalice,' 'Golden Miller,' 'Golden Goblet,' 'Lemon Giant,' 'Cherry Ripe,' 'Cantuar,' and 'Coralie.'

F. Burton, Esq. : Irises 'Topaz,' 'Misty Morn,' 'Ivory Picture,' and 'Crown Jewel.'

JOINT RHODODENDRON COMMITTEE.—Mr. E. H. WILDING in the Chair, and seven other members present.

Awards Recommended :—

First-class Certificate.

To *Rhododendron* × 'Romany Chal' (votes 7 for), from Lionel de Rothschild, Esq., Exbury House, Southampton. See JOURNAL R.H.S. 58, xxxix.

Award of Merit.

To *R.* × 'Cinnandrum' var. 'Tangerine' (votes 6 for), from Lord Aberconway, Bodnant, N. Wales.

To *R. megacalyx* (votes 7 for), from Admiral Walker-Heneage-Vivian, Clyne Castle, Swansea.

Other Exhibits.

Lord Aberconway : *R.* × 'Cinnandrum' (*R. cinnabarinum* × *R. polyandrum*).

Lt.-Col. E. H. W. Bolitho, Trengwainton, Heamoor, Cornwall : *R. bullatum*.

Collingwood Ingram, Esq., Benenden, Kent : a seedling *Rhododendron*, evidently a *R. Fortunei* hybrid.

JOINT ROCK GARDEN PLANT COMMITTEE.—Major F. C. STERN, F.L.S., in the Chair, and seven other members present.

Awards Recommended :—

Preliminary Commendation.

To *Carduncellus pyreneus* as a hardy rock garden or alpine house plant (votes 5 for, 1 against), from Mr. Clarence Elliott, Stevenage.

To *Dicentra peregrina* var. *pusilla* as an alpine house plant (votes unanimous), from Mrs. G. Anley, St. George's, Woking.

Cultural Commendation.

To Mr. F. Barker, Onosma, Stevenage, for a large pan of *Calceolaria Darwinii*.

Other Exhibits.

G. P. Baker, Esq., Sevenoaks : *Carmichaelia Enysii*.

F. H. A. Booth, Esq., Chiddingfold : *Phlox masoleuca*.

Messrs. C. Elliott, Stevenage : *Pentstemon procerus* var. *Tolmiei*, *Veronica Teucrium* var. *Bastardii*.

W. J. Lock, Esq., South Croydon : *Saxifraga* × *croydonensis*.

Comm. C. Pinsent, Stevenage : *Campanula* sp.

JUNE 22, 1937.

Mr. C. C. ELEY in the Chair.

A lecture was given by Mr. R. S. Lynch on "Gardens of Easy Maintenance."

SCIENTIFIC COMMITTEE.—Mr. E. A. BOWLES, M.A., F.L.S., F.R.E.S., V.M.H., in the Chair, and three other members present.

Variation in Delphinium.—Dr. Barnes showed a curious Delphinium which annually produced blue flowers at the bottom of the spike with a purplish suffusion, the upper part consisting of blue flowers but with, especially up to the middle of the spike, some flowers suffused with mauve. The stamens were in some instances carpeloid and the follicles were often open. No seed had been set at any time, although the flowers had been pollinated.

Cotton pod.—A dehiscent pod of a species of *Ceiba* sent from the Argentine was shown with a mass of cotton several inches through.

FRUIT AND VEGETABLE COMMITTEE.—Mr. E. A. BUNYARD, F.L.S., in the Chair, and seven other members present.

Selected for trial at Wisley.

Seedling Cherry from Mr. C. J. Howlett, The Yews, Earley, Berks.

Other Exhibits.

Mr. C. J. Gleed, Hants C.C. Fruit Station, Botley : Strawberry 'Cambridge Early.'

R.H.S. Commercial Fruit Trials, Wisley : Gooseberries 'Bedford Red,' 'Careless,' 'Gautrey's Earliest,' 'Green Gem,' 'Lancashire Lad,' 'Lancer,' 'Leveller.'

FLORAL COMMITTEE A.—Mr. J. M. BRIDGEFORD in the Chair, and twelve other members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. Blackmore & Langdon, Bath, for Delphiniums.

Silver-gilt Banksian Medal.

To Messrs. Prichard, Christchurch, for *Iris Kaempferi*, Water Lilies and other hardy plants.

Silver Flora Medal.

To Messrs. Barr, Taplow, for herbaceous plants.

To Messrs. Feed, West Norwood, for *Streptocarpus*.

Silver Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Border Carnations.

To Messrs. Bath, Wisbech, for Pæonies.

To Mr. E. Ladhams, Elstead, for herbaceous plants and Water Lilies.

To Messrs. Low, Enfield, for Carnations and other greenhouse plants.

To Suffolk Seed Stores, Woodbridge, for herbaceous plants.

Flora Medal.

To Mr. W. E. B. Archer & daughter, Sellindge, for Roses.

To Messrs. Engelmann, Saffron Walden, for Zinnias and Carnations.

To Messrs. Simmons, Finchley, for Violas.

Banksian Medal.

To Messrs. Kelway, Langport, for Delphiniums and Pæonies.

To Mr. A. Perry, Enfield, for *Heimerocallis* and other hardy plants.

To Messrs. Spencer, Hockley, for Dahlias.

To Messrs. Wheatcroft, Nottingham, for Roses.

To Mr. G. E. P. Wood, Ashted, for Delphiniums and other hardy plants.

Selected for trial at Wisley.

<i>Dianthus plumarius</i> 'Ariel' <i>Dianthus plumarius</i> 'Ceres' <i>Dianthus plumarius</i> 'Emperor'	} From Mr. E. Ladhams, Elstead.
<i>Pelargonium</i> (subject to naming) from Mr. C. H. Revens, Bury St. Edmunds.	

Other Exhibits.

T. H. Davies, Esq., Blackheath : *Pelargonium* 'Betty Davies.'
 S. Griffith, Esq., Chelsea : Begonias.
 Miss Hopkins, Coulsdon : hardy plants.
 Letchworth Plants, Ltd., Letchworth : herbaceous plants.
 Messrs. Redgrove & Patrick, Sevenoaks : herbaceous plants.

FLORAL COMMITTEE B.—Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and fifteen other members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Messrs. Constable, Southborough, for Lilies.
 To Messrs. Wallace, Tunbridge Wells, for Lilies.

Silver Flora Medal.

To Messrs. Russell, Windlesham, for greenhouse plants.

Lindley Medal.

To Messrs. Bunyard, Maidstone, for species and old varieties of Rose.

Flora Medal.

To Messrs. Burkwood & Skipwith, Kingston, for flowering shrubs.
 To Mr. A. Hansen, New Barnet, for rock garden plants.
 To Messrs. Prichard, Christchurch, for rock garden plants.

Banksian Medal.

To Mr. J. Klinkert, Richmond, for clipped Box trees.
 To Mr. J. Robinson, Eltham, for rock garden plants.
 To Messrs. Rogers, Southampton, for rock garden plants.
 To Mr. G. Welch, Cambridge, for rock garden plants.

Award of Merit.

To *Alstroemeria Ligtu* var. *angustifolia* 'Vivid' as a hardy flowering plant (votes unanimous), from Messrs. W. A. Constable, Burnham. See p. 370.

Preliminary Commendation.

To *Asteranthura ovata* as a hardy flowering plant (votes unanimous), from Lt.-Col. L. C. R. Messel, O.B.E., Handcross.

To *Vaccinium fragile* as a hardy flowering shrub (votes unanimous), from Lord Aberconway, Bodnant.

Other Exhibits.

Messrs. Carter Page, London Wall, E.C. 2 : dwarf conifers.

Messrs. Constable, Burnham : *Alstroemeria Ligtu* var. *angustifolia*.

Mr. A. Corderoy, Eltham : rock garden plants.

Messrs. Elliott, Stevenage : *Campanula latiloba*, Six Hills variety.

Messrs. Fielden & Crouch, Wrotham : rock garden plants.

T. Hay, Esq., Hyde Park, W. 2 : *Digitalis orientalis*.

C. J. Howlett, Esq., Reading : *Fuchsia fulgens* var.

Lt.-Col. L. C. R. Messel, O.B.E., Handcross : *Phlomis purpurea*, *Centranthus longiflorus*, *Alstroemeria haemantha*.

L. de Rothschild, Esq., Exbury : *Callistemon lanceolata* × *acuminata*.

The Rt. Hon. Lord Swaythling, Southampton : *Lilium parvum*, *L. maritimum*, *L. Bolanderi*, hybrids of *L. Martagon*.

Mr. R. Colpoys Wood, West Drayton : flowering shrubs.

Mr. G. Yeld, Gerrards Cross : *Lilium centifolium*.

ORCHID COMMITTEE.—Sir JEREMIAH COLMAN, Bart., in the Chair, and twelve other members present.

Awards Recommended :—

Award of Merit.

To *Miltonia* × 'Deirde Savile' ('Lycaena' × 'Marion Bruce') (votes 11 for), from S. Hinchcliffe, Esq., Daleside, Leeds Road, Harrogate. See p. 372.

To *Brassocattleya* × 'Windsor' (B.-c. × 'Princess Patricia', C. × 'Wembley') (votes 9 for), from Messrs. Black & Flory, Slough. See p. 370.

To *Odontoglossum* × *Perryanum* var. 'Shalston' ('Camilla' × 'Toreador') (votes 10 for, 2 against), from H. S. Wharton, Esq., Shalston, Templewood Avenue, Hampstead. See p. 372.

Other Exhibits.

Messrs. Charlesworth, Haywards Heath : a group of Orchids.

Messrs. Armstrong & Brown, Tunbridge Wells : a group of Orchids.

JOINT IRIS COMMITTEE.—Mr. G. P. BAKER in the Chair, and five other members present.

Awards Recommended :—*Award of Merit.*

To *Iris ochraurea*, for general garden use (votes unanimous), shown by F. Wynn Hillings, Esq., Grove Way, Esher, Surrey. See p. 371.

Preliminary Commendation.

To *Iris senecio* (the albino form of *I. vinicolor*), shown by G. P. Baker, Esq., Hillside, Sevenoaks, Kent.

Other Exhibits.

G. P. Baker, Esq., Sevenoaks, Kent : *Iris chrysographes* × *Iris Grant-Duffii*.

Rev. Canon Rollo Meyer, Little Gaddesden, Berkhamsted, Herts : *Iris spuria* hybrids from Kashmir.

E. A. Bowles, Esq., Myddelton House, Waltham Cross, Herts : *Iris* species, probably one of the Mississippi delta forms.

JOINT DELPHINIUM COMMITTEE.—Mr. G. W. LEAK, V.M.H., in the Chair, and eight other members present.

Awards Recommended :—*Award of Merit.*

To *Delphinium* 'Blue Cambria' (subject to name being changed) (votes unanimous), from Mrs. Hugh Lang, Mingary, Worplesdon Hill, Woking.

To *Delphinium* 'Coronation' (votes unanimous) from F. A. Bishop, Esq., The Glade, Clewer Green, Windsor.

Selected for trial at Wisley.

Delphiniums 'Margaret Rose' and 'Blue Cambria,' from Mrs. Hugh Lang, Worplesdon Hill, Woking.

Delphiniums 'Bluebell,' 'Cavalier,' 'Lavengro' and 'Lorna,' from Messrs. Blackmore & Langdon, Bath.

Delphiniums 'Merstham Jewel' and 'Coronation,' from F. A. Bishop, Esq., Clewer Green, Windsor.

Delphinium 'Robina Bickerton' as a variety for cutting, from Mrs. R. E. Docwra, Upper Brighton Road, Surbiton, Surrey.

Other Exhibits.

Mrs. Hugh Lang : *Delphiniums* 'May Lang' and 'Hugh Lang.'

J. G. Vautier, Esq., Stanley Avenue, Beckenham, Kent : *Delphinium* 'St. Brelade.'

Messrs. Blackmore & Langdon : *Delphiniums* 'Famille Rose,' 'Chrystal,' 'Rhapsody' and 'Eventide.'

Hon. Mrs. Trollope-Bellow, Casewick, Stamford, Lincs : *Delphinium* 'Casewick.'

H. C. Barder, Esq., Ormonde Hall, Bolney, Sussex : *Delphinium* 'Myra Clements.'

JOINT ROCK GARDEN PLANT COMMITTEE.—The Viscountess BYNG in the Chair, and six other members present.

Exhibits.

G. P. Baker, Esq., V.M.H., Sevenoaks : *Hypericum empetrifolium*, *Sedum fastigiatum*, *Sedum Praegerianum*.

Messrs. Clarence Elliott, Stevenage : *Dianthus* 'C. T. Musgrave.'

BOOKS AND PAMPHLETS PRESENTED, PURCHASED OR REVIEWED DURING THE YEAR ENDING DECEMBER 31, 1936, AND DEPOSITED IN THE LINDLEY LIBRARY.

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Abbreviations.—Col. pls. = coloured plates; illus. = illustrated or illustrator; ed. = editor, edited or edition; fol. = folio; trans. = translation.

For books published in London, the place of publication is not named in the entry.

- Abdul-Hafiz, Syed.** A treatise on rose-culture in Hyderabad-Deccan and its suburbs. Illus. 8vo. Hyderabad-Deccan, [1936]. (3)
Abel, Gottlieb Friedrich. See REITER, J. D.
Aberconway, Lord. See McLAREN, H. D.
Acosta, Joseph de. The natural and moral history of the Indies. Reprinted from the English translated ed. of EDWARD GRIMSTON, 1604. Ed. by CLEMENTS R. MARKHAM. 2 vols. 8vo. 1880. (2)
Adam, Heinrich. Unterricht im Landschaft-Zeichnen. fol. Munich, [c. 1835]. (4)
Adamović, Lujo. Die Pflanzenwelt Dalmatiens. Illus. 8vo. Leipzig, 1911. (2)
Albert, Abel, & Jahandiez, Émile. Catalogue des plantes vasculaires qui croissent naturellement dans le département du Var. Introduction sur la géographie botanique . . . par CH. FLAHAULT. Illus. Map. 8vo. Paris, 1908. (C)
Albertus Magnus. De vegetabilibus libri VII, historiae naturalis pars XVIII. Ed. criticam ab ERNESTO MEYERO coeptam absolvit CAROLUS JESSEN. Illus. 8vo. Berlin, 1867. (2)
Allen, Grant. The story of plants. Illus. 8vo. 1901. (C)
Allendorff, Walter. Kulturpraxis der Kalt- und Warmhauspflanzen; Handbuch der Topfpflanzenkultur. Herausgeg. von C. BONSTEDT. 6th ed. Illus. 8vo. Berlin, 1934. (2)
Allwood, Montagu Charles. Carnations and all Dianthus. With a foreword by Lord ABERCONWAY. Col. pl. Illus. 8vo. Haywards Heath, [1935]. (2)

- Alm, Carl Gustaf, & Fries, Thore Christian Elias.** Monographie der Gattung *Blaeria* L. (Acta Horti Berg., viii). Illus. 8vo. Uppsala, 1924. (2)
- American Association of Nurserymen.** Horticultural standards, 1923. 8vo. n.p., [1923]. (5)
- American Society for Horticultural Science.** Proceedings. Vols. [21]–32, for 1924–34. Illus. 8vo. College Park, Maryland, [1925–27]; Geneva, N.Y., [1928]–1935. (5)
- Amherst, Alicia Margaret Tyssen.** On a fifteenth century treatise on gardening by "Mayster" ION GARDENER [transcribed] with remarks. (Archaeologia, liv.) 4to. 1894. (3)
- Amsterdam.** International Botanical Congress, 1935. Proceedings. Ed. by M. J. SIRKS. 2 vols. Illus. 8vo. Leyden, 1935–36. (2)
- André, Edouard.** See ROTHSCILD, J. Les fougères. Vol. 1.
- Anson, Sir Edward Reynell.** The small garden and how to make the most of it. Illus. 8vo. 1936. (1)
- Arber, Agnes (Mrs. E. A. N. Arber, née Robertson).** A recent discovery in sixteenth century botany. (Nature, cxxxvii.) 8vo. 1936. (3)
- Armer, Laura Adams.** Cactus. Illus. by SIDNEY ARMER. Col. pl. Illus. 8vo. New York, 1934. (2)
- Armer, Sidney.** Illus. See ARMER, L. A. Cactus.
- Armitage, Ethel.** A country garden. Illus. by JOHN FARLEIGH. Illus. 8vo. 1936. (1)
- Aubriet, Claude.** Illus. See VAILLANT, S. Botanicon Parisiense. 1727. — Illus. [Unpublished paintings of flowering plants, on vellum.] Col. pls. fol. [Paris, 17—.] (C)
- Illus. [Unpublished drawings of plants done under the direction of ANTOINE DE JUSSIE.] 3 vols. Illus. 8vo. n.p., [c. 1720–43]. (C)
- Ayre, Mrs. A. M.** Wild flowers of Newfoundland. Part 3. Illus. 8vo. St. John's, Newfoundland, & Ashford, England, 1935. (2)
- Babička, J.** See NEMEC, B., and OTHERS. Über das Vorkommen.
- Bailey, Liberty Hyde.** The principles of fruit-growing. 2nd ed. Illus. 8vo. New York, 1898. (C)
- The Nursery-book. 13th ed. Illus. 8vo. New York, 1909. (C)
- & others. Garden-making: suggestions for the utilizing of home grounds. Illus. New York, 1898. (C)
- Bailly, C.** Nouveau manuel complet du jardinier. Nouvelle éd., enrichie . . . par M. BOSSIN. 2 vols. Illus. 6mo. Paris, 1843. (2)
- Baker, H. Clinton.** See CLINTON-BAKER, H. W.
- Baker, John Gilbert.** A synopsis of Aloineae and Yuccoideae. (Journ. Linn. Soc. Bot., xviii.) 8vo. [1880.] (C)
- Baker, Richard St. Barbe.** Among the trees. With a foreword by THEO. A. STEPHENS. Illus. 8vo. 1935. (2)
- Baker, Richard Thomas.** The hardwoods of Australia and their economics. (Techn. Mus., N.S. Wales, Techn. Educ. ser., xxiii.) Col. pls. Illus. 4to. Sydney, 1919. (2)
- Ballings, Mlle. S.** Illus. See EBERHARDT, Ph. Les plantes médicinales.
- Barron, William, & Son, Ltd.** Principal works carried out. Illus. 8vo. Borrowash, nr. Derby, [c. 1930]. (3)
- Bathurst, Sir Charles, Viscount Bledisloe.** Foreword. See GARNER, H. V., & OTHERS. Profit from fertilizers.
- Bauer, Erwin.** Die wissenschaftlichen Grundlagen der Pflanzenzüchtung; ein Lehrbuch für Landwirte, Gärtner und Forstleute. Col. pls. Illus. 8vo. Berlin, 1921. (6)
- Bauer, Ferdinand.** Illus. Illustrationes florae Novae Hollandiae. Col. pls. fol. 1813. (C)
- Baxter, William.** [Original water-colour drawings by local Oxford artists to illustrate *British phanerogamous botany*.] 3 vols. Col. pls. Illus. 4to. [Oxford, 1832–42.] (C)
- Bean, William Jackson.** Foreword. See CLINTON-BAKER, H. W. Illustrations of new conifers.

- Bedevian, Armenag K.** Illustrated polyglottic dictionary of plant names in Latin, Arabic, Armenian, English, French, German, Italian and Turkish languages. Illus. 8vo. Cairo, 1936. (2)
- Bedford, 11th Duke of.** See RUSSELL, HERBRAND ARTHUR.
- Belgrade (Beograd).** University Botanic Garden. Glasnik botanickog Zavoda i Bašte. Bulletin de l'Institut et du Jardin botaniques. Vols. 1-3, no. ii. Illus. 8vo. Belgrade, 1928-34.
- Bell, J. W.** Nature's remedies: a popular treatise on the chemistry of herbs, their curative powers, etc. Illus. 8vo. 1936. (1)
- Belgrad.** See BELGRADE.
- Berg, Albert.** Physiognomy of tropical vegetation in South America: a series of views. Études physionomiques, etc. Physiognomie, etc. Illus. fol. London & Düsseldorf, 1854. (C)
- Bernhard, Oscar.** Pflanzenbilder auf griechischen und römischen Münzen, eine naturwissenschaftlich-numismatische Studie. Illus. 8vo. Zürich, 1925. (2)
- Berthelot, Sabin.** See WEBB, P. B. Histoire naturelle des Îles Canaries.
- Bessa, Pancrace.** Illus. See MICHEL, E. Traité du citronier.
- Bews, John William.** The growth-forms of Natal plants. (Trans. Roy. Soc. S. Afr.) 8vo. Cape Town, 1915. (2)
- Bhattacharji, Bodhi Sattwa, & others.** Practical rose growing in India. Col. pls. Illus. 8vo. Calcutta, 1935. (3)
- Bigelow, Jacob.** Flora Bostoniensis. A collection of plants of Boston and its vicinity. 2nd ed. 8vo. Boston, Mass., 1824. (2)
- Bixby, Willard G.** Nut growing in the United States. (N. Nut Grow. Ass. Bull., 5.) 2nd ed. Illus. 8vo. Baldwin, N.Y., 1920. (2)
- Blackstone, John.** Fasciculus plantarum circa Harefield sponte nascentium. 12mo. 1737. (2)
- Blakeley, W. F.** A key to the eucalypts, with descriptions . . . and a companion to J. H. MAIDEN's *Critical revision of the genus Eucalyptus*. Illus. 8vo. Sydney, 1934.
- Bledisloe, Viscount.** See BATHURST, C.
- Blume, Carl Ludwig.** Flora Javæ nec non insularum adjacentium . . . adjutore J. B. FISCHER. 12 sect. (in 4 vols.). Col. pls. Illus. fol. Bruxelles, 1828[-52]. (C)
- Flora Javæ . . . nova series. Vol. 1 [Orchideæ]. Col. pls. Illus. fol. Leiden, 1858. (C)
- Blume, Karel Lodewijk.** See BLUME, CARL LUDWIG.
- Bobart, Jacob, father and son.** See STEPHENS, P. Catalogus horti botanici Oxoniensis.
- Boeuf, F.** Les bases scientifiques de l'amélioration des plantes. Illus. 8vo. Paris, 1936. (2)
- Böhmerle, Emil.** Waldbauliche Studien über den Nuszbaum und die Edelkastanie. Illus. 8vo. Vienna, 1906. (2)
- Bolus, Harry.** Contributions to the African flora. (Trans. S. Afr. Phil. Soc., xvi.) Illus. 8vo. [Cape Town], 1906. (2)
- & KENSIT, Louisa. Contributions to the African flora. (Trans. Roy. Soc. S. Afr., i.) Illus. 8vo. Cape Town, 1909. (2)
- & WOLLEY-DOD, Anthony H. A list of the flowering plants and ferns of the Cape Peninsula, with notes. (Trans. S. Afr. Phil. Soc., xiv.) 8vo. Cape Town, 1903. (2)
- Bonavia, Emanuel.** The flora of the Assyrian monuments and its outcomes. Illus. 8vo. 1894. (2)
- [Bonnefons, Nicolas de.]** Le jardinier françois. 2nd ed. Illus. 12mo. Paris, 1651. (C)
- Bonnier, Gaston.** British flora. Trans. by ETHEL MELLOR. Illus. 8vo. 1925. (2)
- Bonpland, Aimé.** See HUMBOLDT, F. H. A. VON.
- Bonstedt, Carl.** Ed. See ALLENDORFF, W. Kulturpraxis. 6th ed.
- Bossin, —.** Ed. See BAILLY, C. Nouveau manuel.

- Bostock, Frederick.** Lorette pruning: examples of pear and apple bushes and pyramids in bloom, planted as 2-year-olds in 1925-28 and Lorette pruned throughout. Illus. 4to. Northampton, 1936. (3)
- Botanical Magazine (Curtis's).** Vol. 70, conducted by SAMUEL CURTIS, the descriptions by Sir WILLIAM JACKSON HOOKER. Col. pls. Illus. 4to (*large-paper ed.*). 1844. (C)
- Bouly, Mlle. J.** Illus. See MAUBLANC, A. Les champignons comestibles.
- Bowers, Clement Gray.** Rhododendrons and azaleas, their origins, cultivation and development. With illustrations in colour by FRANK TAYLOR BOWERS. Col. pls. Illus. 8vo. New York, 1936. (1)
- Bowers, Frank Taylor.** Illus. See BOWERS, C. G. Rhododendrons.
- Braam-Houckgeest, Andreas Everard van.** Icones . . . e bibliotheca Braamiana. See CHINA.
- Braun-Blanquet, Josias, & Maire, René.** Contributions à l'étude de la flore marocaine. Fasc. 1-3. (Bull. Hist. Nat. Afr. Nord, xiii-xiv.) 8vo. Alger, 1922-23. (8)
- Briggs, Barbara.** Trees of Britain, their form and character. Illus. 8vo. (1936.) (1)
- Brimble, Lionel John Farnham.** Intermediate botany. Illus. 8vo. 1936. (1)
- British Association for the Advancement of Science.** See MOTTRAM, R. H. Scientific survey of Norwich.
- Britton, Nathaniel Lord, & Shafer, John Adolph.** North American trees. Illus. 8vo. 1908. (C)
- Brookshaw, George.** Groups of flowers . . . with full directions for the young artist. 2nd ed. Col. pls. Illus. fol. 1819. (C)
- Brouërrius van Nidek, Matthæus.** Het zegenpralend Kennemerland vertoond . . . door HENDRIK DE LETH. Illus. fol. Amsterdam, [173-]. (C)
- Brown, O. Phelps.** The complete herbalist, or the people their own physicians by the use of nature's remedies. Col. pls. Illus. 12mo. 1867. (C)
- Browne, William.** See STEPHENS, P. Catalogus horti botanici Oxoniensis.
- Brunchorst, Jørgen.** Ueber eine sehr verbreitete Krankheit [*Spongospora Solani*] der Kartoffelknollen. (Bergens Mus. Aarsb.) Illus. 8vo. Bergen, 1887. (2)
- Brunfels, Otto.** [Herbal.] See SPRAGUE, T. A. 1928.
- Buc'hoz, Pierre Joseph.** Collection coloriée des plus belles variétés de Tulipes. Col. pls. fol. Paris, 1781. (C)
- Collection coloriée des plus belles variétés de Jacinthes . . . dans les jardins fleuristes d'Harlem. Col. pls. fol. Paris, 1781. (C)
- Les dons merveilleux et diversement coloriés de la nature dans le règne végétal. Col. pls. fol. Paris, [1779-83]. (C)
- Collection précieuse et enluminée des fleurs les plus belles . . . de la Chine, etc. Col. pls. fol. Paris, [1776]. (C)
- Bulliard, Pierre.** Flora Parisiensis, ou descriptions et figures des plantes qui croissent aux environs de Paris. 6 vols. Col. pls. 8vo. Paris, 1776-83. (C)
- Bunyard, Edward Ashdown.** Old garden roses. Col. pl. Illus. 8vo. 1936. (1)
- Bureau, Édouard.** Monographie des Bignoniacées. Part 1 & Atlas (*all published*). Illus. 4to. Paris, 1864. (C)
- Étude sur les Narcisses du groupe des *Corbularia*. (Bull. Soc. Sci. Nat. Ouest Fr., Sér. 2, iv.) Maps. 8vo. Nantes, 1904. (2)
- Burkill, Isaac Henry, & others.** A dictionary of the economic products of the Malay Peninsula. 2 vols. 8vo. 1935. (2)
- Burmann, Johan.** *Wachendorfia*. Illus. fol. Amsterdam, 1757. (C)
- Burnett, Gilbert Thomas.** The cyclopaedia of useful and ornamental plants. Ed. by RODERICK ELPHINSTONE. Col. pls. 4to. [18—.] (C)
- Burt-Davy, Joseph.** See DAVY, J. BURTT.

- Bute, 3rd Earl of.** See STUART, JOHN (1713-92).
- Byne, Arthur.** See BYNE, M. S. Spanish gardens.
- Byne, Mildred Stapley, & Byne, Arthur.** Spanish gardens and patios. Col. pl. illus. 8vo. Philadelphia, etc., 1924. (C)
- Callmar, Gunnar.** See JOHANSSON, E. Befruktnings-förhållanden. 1936.
- Cambridge.** National Institute of Agricultural Botany. Journal. Vols. 1-3. 8vo. Cambridge, 1922-34.
- Carrière, Elie Abel.** [Articles.] See TULIPS.
- Castel, R. A. Fréard du.** See [FRÉARD DU CASTEL, R. A.].
- Catalogue of English Authors . . . on husbandry, gardening, etc.** See [WESTON, R.].
- Catesby, Mark.** The natural history of Carolina, Florida and the Bahama Island: containing figures of birds, beasts, fishes, serpents, insects and plants . . . with their descriptions in English and French . . . revis'd by [GEORGE] EDWARDS. [3rd ed.] Col. pls. 2 vols. fol. 1754. (C)
- Cattley, William.** Icones [nunc in bibliotheca . . . G. Cattley]. See CHINA.
- Cavara, Fridiano.** Tuberizzazione di radici secondare in *Scilla bifolia*. (Rend. Accad. Sci. Fis. Napoli.) Illus. 8vo. Naples, 1912. (2)
- Chamberet, —.** See CHAUMETON, F. P. Flore médicale.
- Champy, P.** Flore de l'Algérie . . . les planches dessinées par THÉOPHILE THOULET. Col. pls. fol. Paris, 1843. (C)
- Flore algérienne, avec texte descriptif, ornée de planches . . . par TH. TOULET. Col. pls. 8vo. Paris, 1844. (C)
- Chaumeton, François Pierre.** Flore médicale décrite par [F. P.] CHAUMETON, [J. L. M.] POIRET et CHAMBERET, peinte par Mme. E. PANC-KOUCKE et P. J. F. TURPIN. Nouvelle publication. Vols. 1-6. Col. pls. 8vo. Paris, 1829-42. (C)
- Chavée-Leroy, —.** La maladie de la vigne et la maladie des vers a soie. 8vo. Laon, 1881. (2)
- La maladie des pommes de terre. 2nd ed. 8vo. Paris, 1883. (2)
- China.** Icones plantarum sponte China nascentium; [nunc in bibliotheca . . . GULIELMI CATTLEY] e bibliotheca Braamiana excerptae. Col. pls. fol. 1821. (C)
- Chinese Artists.** [Coloured drawings by.] See [DRAWINGS, COLOURED].
- Ching, Ren Chang.** See HU, H. H. Icones Filicum Sinicarum.
- Chopard, L.** La végétation des Açores. (La terre et la vie, i.) Illus. 8vo. [Paris, 1931.]
- Clapham, Arthur Roy.** See JAMES, W. O. Biology of flowers.
- Clarke, Stephenson Robert.** Foreword. See JACKSON, A. B. Catalogue of trees . . . at Borde Hill. 1935.
- Clinton-Baker, Henry William, & Jackson, Albert Bruce.** Illustrations of new conifers. With a foreword by W. J. BEAN. Illus. 4to. Hertford, 1935. (1)
- Coal Utilisation Council.** Glass house heating with solid fuel. (C.U.C. Techn. Bull.) Illus. 8vo. [1936.]
- Cobb, Arthur John.** Ed. Modern garden craft: a guide to the best horticultural practice, private and commercial. 3 vols. Col. pls. Illus. 8vo. 1936. (1)
- Cochran, W. G.** Statistical report. See VOELCKER, J. A., & RUSSELL, E. J. Fifty years.
- Coley, Hilda.** Our heritage of garden flowers. Col. pls. 8vo. 1936. (1)
- Colgan, Nathaniel.** Flora of the County Dublin: flowering plants, higher cryptogams, and Characeae. Map. 8vo. Dublin, 1904. (2)
- Collins, Mortimer.** Thoughts in my garden. Edited by EDMUND YATES. 2 vols. 8vo. 1880. (C)
- Colvin, Esther M.** See WARNER, M. F., & OTHERS. Bibliography of plant genetics.
- Commelin, Caspar.** Horti medici Amstelaedamensis plantae rariores et exoticae. Illus. 4to. Leiden, 1706. (C)

- Commelin, Jan.** *Ed. See RHEEDE TOT DRAAKENSTEIN, H. A. VAN.*
Horti Malabarici pars prima.
- Compton, Robert Harold.** The flora of the Whitehill district. (Trans. Roy. Soc. S. Afr., xix.) 8vo. Cape Town, 1931. (2)
- Conder, Josiah.** The floral art of Japan, being a second and revised edition of *The flowers of Japan*. Col. pls. Illus. fol. Tokyo, 1899. (2)
- The theory of Japanese flower arrangements, being a reprint . . . to which have been added thirty-six plates of modern ikenobe and moribana arrangements. Col. pls. Illus. 8vo. Kobe & London, 1935. (2)
- Conrad (or Konrad) von Megenberg.** *See CUNRAT VON MEGENBERG.*
- Cooke, Mordecai Cubitt.** Edible and poisonous mushrooms. Col. pls. 8vo. 1894. (C)
- Correvon, Henri.** Floraire : genèse et développement d'un jardin séculaire. Illus. 8vo. Geneva, 1936. (3)
- Courval, Vicomte De.** Taille et conduite des arbres forestiers, etc. 2nd ed. Illus. 8vo. Paris, 1861. (2)
- Couthino, Antonio Xavier Pereira.** Suplemento da flora de Portugal. (Bol. Soc. Brot., Ser. 2, x.) 8vo. [Coimbra], 1935. (3)
- Craib, William Grant.** Florae Siamensis enumeratio. A list of the plants known from Siam, with records of their occurrence. Vol. 1; vol. 2, pts. i-ii. 8vo. Bangkok & London, 1925-34. (2)
- Cranston, John.** Cultural directions for the rose. 7th ed. 8vo. Kings Acre, near Hereford, 1888. (2)
- Croix, Louis Joseph de.** *See SAVARY, P. DE.*
- Cromber, Bernard.** Illus. *See VERBRUGGE, J. C., & OTHERS.* [Coloured drawings.]
- Cummins, Julia H.** Flower garden primer, or gardening without tears. Illus. 8vo. New York, 1936. (1)
- Cunrat von Megenberg.** Das Buch der Natur von CONRAD VON MEGENBERG . . . in neu-hochdeutscher Sprache bearbeitet . . . von HUGO SCHULZ. 8vo. Greifswald, 1897. (2)
- Curtis, Samuel.** *Ed. See BOTANICAL MAGAZINE.*
- Curtis, William, & others.** Flora Londinensis : containing a history of the plants indigenous to Great Britain. New edition, enlarged by GEORGE GRAVES and WILLIAM JACKSON HOOKER. 5 vols. Col. pls. fol. 1835 [published 1817-28]. (C)
- Dakers, James Silver.** Early vegetables under glass. Illus. 8vo. (1936.) (1)
- Dallimore, William.** *See NASH, J.* Poisonous plants.
- Davies, David.** The case of labourers in husbandry . . . a view of their distressed condition, etc. . . . containing a collection of accounts shewing the earnings and expences of labouring families. 4to. 1795. (C)
- Davy, Joseph Burt.** Notes on the genus *Ficus* (Tourn.) Linn. (Trans. Roy. Soc. S. Afr., ii.) Illus. 8vo. Cape Town, 1911. (2)
- Day, Harry A.** Town garden problems solved : one hundred small garden questions answered. 8vo. [1936.] (1)
- De Bonnefons, Nicolas.** *See BONNEFONS, N. DE.*
- De Croix, L. J.** *See CROIX, L. J. DE.*
- De Koker, Aegidius.** *See KOKER, A. VAN.*
- De La Tour, Mme. Charlotte.** Le langage des fleurs. 10th ed. Col. pls. 8vo. Paris, [c. 1865]. (2)
- De Leth, Hendrik.** *See LETH, H. DE.*
- De Savary, P.** *See SAVARY, P. DE.*
- Deutsche Kakteen-Gesellschaft.** Zeitschrift für Sukkulentenkunde. Vols. 1-3. Col. pls. Illus. 8vo. Berlin, 1923-28.
[continued as]
Monatschrift der Deutschen Kakteen-Gesellschaft, Berlin. Vols. 1-4. Col. pls. Illus. 8vo. Berlin, 1929-32. (C)

- [Dezallier d'Argenville, Antoine Joseph.] The theory and practice of gardening . . . [incorrectly attributed to] ALEXANDER LE BLOND; done from the late edition printed at Paris by JOHN JAMES. 2nd ed. Illus. 4to. 1728. (C)
- La theorie et la pratique du jardinage . . . par L.S.A.J.D.A. [i.e. Le Sieur A. J. DEZALLIER D'ARGENVILLE]. 3rd ed. Illus. 4to. The Hague, 1739. (C)
- Dicksons & Co. of Edinburgh. A catalogue of hot-house, green-house and hardy plants. 8vo. n.p., 1792. (2)
- A catalogue of fruit and forest trees, . . . shrubs, herbaceous plants, etc. 8vo. Edinburgh, 1827. (2)
- Diels, Ludwig. *Diapensia purpurea* Diels, nov. spec. aus Szechuan. (Fedde, Rep. Sp. Nov., x.) [Berlin], 1912. (2)
- Diapensiaceen-Studien. (Engler, Bot. Jahrb., Suppl.) Illus. 8vo. Leipzig & Berlin, 1914. (2)
- Dietrich, David. Forst. Flora oder Abbildung und Beschreibung der für den Forstmann wichtigen wildwachsenden Bäume und sträucher, Sowie die nützlichen und schädlichen Kräuter. 5th ed. 2 vols. Col. pls. 4to. Leipzig [between 1863 and 1887]. (C)
- Dod, A. H. Wolley-. See WOLLEY-DOD, A. H.
- Dodoens, Rembert. Cruydt-boeck . . . volghens sijne laetste verbeteringhe . . . van nieuws oversien ende verbeterd. Illus. fol. Antwerp, 1644. (2)
- Döll, Wilhelm. Transl. & Ed. Der Rosen-Garten. See PAUL, W. 1855.
- Don, David. An account of the Lambertian herbarium. See LAMBERT, A. B. Description of . . . *Pinus*. 2nd ed.
- Doposcheg-Uhlár, Joseph. Frühblüte bei Knollenbegonien. (Flora, civ.) Illus. 8vo. Jena, 1912. (2)
- Studien zur Verlaubung und Verknollung von Sprossanlagen bei Wasserkultur. (Flora, cvi.) Illus. 8vo. Jena, 1913. (2)
- Dörfler, Ignaz. Über den Bastard *Anagallis arvensis* × *coerulea*. (Verhandl. zool.-bot. Ges. Wien). 8vo. Vienna, 1903. (2)
- Draheim, Walter. Beiträge zur Kenntnis des Wurzelwerks von Iridaceen, Amaryllidaceen und Liliaceen. (Bot. Archiv., xxiii.) Illus. 8vo. Leipzig, 1929. (2)
- Drapiez, Pierre Auguste Joseph. Ed. Encyclographie du règne végétal, présentant la figure, la description et l'histoire des plantes le plus récemment découvertes, etc. 4 vols. Illus. 4to. Bruxelles, 1833-36. (C)

(To be continued.)

EXTRACTS FROM THE PROCEEDINGS

OF THE

ROYAL HORTICULTURAL SOCIETY.

NOTICES TO FELLOWS.

SUBSCRIPTIONS.

Fellows are reminded that anyone joining the Society after *July 1* and before *October 1* will be required to pay only a half-year's subscription, and will receive the monthly Journal commencing with the July number. Those joining after *October 1* and before *January 1* pay a full year's subscription which entitles them to all the privileges of Fellowship until *January 1*, 1939. Back numbers of the Journal are obtainable by Fellows at 9d. a number.

GREAT AUTUMN FLOWER SHOW.

The Great Autumn Flower Show is again being held in the National Hall, Olympia, on *September 29, 30, and October 1*. Next in importance to the Spring Show at Chelsea, this Great Autumn Show affords a wonderful opportunity for gathering together all the beautiful flowers and plants which make autumn brilliant with their colours, and Fellows are recommended to make a special effort to visit this Show, not only to enjoy the spectacle, but also to consider the matter of restocking their gardens during the coming planting season.

Particulars of the hours of admission to the Show are given below, and they are also printed on the back of Fellows' tickets.

September 29, 11 A.M. to 9.30 P.M.
September 30, 10 A.M. to 9.30 P.M.
October 1, 10 A.M. to 5 P.M.

The prices of admission for non-Fellows are :

	s.	d.
<i>September 29.</i> —11 A.M. to 2 P.M. . . .	10	0
2 P.M. to 6 P.M.	5	0
6 P.M. to 9.30 P.M.	2	6
<i>September 30.</i> —10 A.M. to 6 P.M.	2	6
6 P.M. to 9.30 P.M.	1	0
<i>October 1.</i> —10 A.M. to 5 P.M.	1	0

For those going to the Show in private cars there is garage accommodation adjoining the Grand Hall, Olympia, and also several other garages and public car parks in the vicinity, particulars of which may be found in the lists which are published in the Motoring Handbooks.

SPECIAL AWARDS AT THE GREAT AUTUMN SHOW.

To commemorate the Accession of His Majesty King George VI, who is a Patron of this Society, four special silver-gilt Accession Cups are to be offered for award at the Great Autumn Show this year for outstanding exhibits from amateurs or horticultural traders.

As in former years, two Challenge Cups will be competed for at the Autumn Show : the Coronation Cup which is offered for the best exhibit at the Show, and the Wigan Cup which is offered for the best exhibit of Roses.

FRUIT AND VEGETABLE SHOW.

The Fruit and Vegetable Show will be held in the Old Hall on *October 12 and 13*, and intending exhibitors are asked to apply to the Secretary for the special schedule.

Four Challenge Cups will be competed for at this Fruit and Vegetable Show :

- (1) The George Monro Memorial Cup, which is offered for the best exhibit of Grapes shown by an amateur.
- (2) The Gordon-Lennox Cup, which is offered for the most meritorious display of fruit staged by an amateur in the competitive classes.
- (3) The Affiliated Societies' Cup for Fruits, awarded for the best exhibit of fruits staged by an Affiliated Society.
- (4) The Society's Vegetable Challenge Cup, which is offered for award to the competitor who secures the greatest number of prize points in the classes for vegetables.

The following cups are offered for award outright :

- (1) The Riddell Trophy, which is offered for award in the class for a table of Vegetables.
- (2) The Sutton Vegetable Cup, which is offered for the best exhibit of twelve distinct kinds shown by an amateur.

Full particulars in regard to these cups are given in the special schedule.

CONFERENCE ON FLOWERING TREES AND SHRUBS.

Arrangements in connexion with the Conference on Flowering Trees and Shrubs (other than Rhododendrons), which is to be held on *April 26, 27 and 28, 1938*, are progressing satisfactorily, and it should be possible in the near future to announce the names of the speakers at each session of the Conference, the draft programme of which is given below :

Tuesday, April 26, 1938. Afternoon Session, 3-5 P.M.

Introductory Address by the President.

Arrangement of Flowering Trees and Shrubs, including their Use on Walls, Rock Gardens, etc.

Wednesday, April 27, 1938. Morning Session, 11 A.M.-1 P.M.

Cherries, Crabs and their Allies.

The Broom and Cistus Families.

Wednesday, April 27, 1938. Afternoon Session, 2.30-5 P.M.

Cotoneasters, Viburnums and Barberries.

Lilacs, Philadelphus, Deutzias, Weigelas, Hibiscus and Escallonias.

Thursday, April 28, 1938. Morning Session, 11 A.M.-1 P.M.

Other Families of Flowering Trees and Shrubs.

Flowering Trees and Shrubs for various climates and soils. Preparation for Planting and Selection of Kinds.

Thursday, April 28, 1938. Afternoon Session, 2.30-5 P.M.

Magnolias and Camellias.

Propagation and Pruning.

It is proposed that the speakers should be asked to submit a paper for publication, which will be circulated in proof form to all those attending the Conference, and, assuming that his paper had been read, each speaker would address the Conference for some 15-20 minutes, preferably illustrating his remarks with lantern slides.

All Fellows who hope to attend the Conference are asked to notify the Secretary so that they may be kept informed of arrangements in connexion with the Conference and so that an estimate may be made of the number of advance copies of papers required.

As further details become available they will be published in these notices.

CALENDAR.

September 4, 2.30 P.M. to 8 P.M.—London Allotments and Gardens Show Society hold their exhibition in the New Hall.

September 7, 12 noon to 7.30 P.M.—National Dahlia Society's Show in the New Hall. Fellows' tickets admit free.

September 7, 1 to 7.30 P.M.—Alpine Garden Society's Show in the Old Hall. Fellows' tickets admit free.

September 8, 10 A.M. to 5 P.M.—National Dahlia Society's Show and the Alpine Garden Society's Show, continued.

September 10, 12 noon to 7 P.M.—National Rose Society's Show in both Halls. Fellows' tickets admit free.

September 11, 11 A.M. to 5 P.M.—National Rose Society's Show, continued.

September 14, 12 noon to 6 P.M.—Fortnightly Meeting and Show of Flowers in season. On this occasion a Silver Trophy will be offered for award for Cacti and Succulents, and two Sewell Medals will be offered for award for rock garden or alpine house plants. See below.

At 3.30 P.M. in the Lecture Room of the New Hall on *September 14*, Professor F. E. Weiss, LL.D., F.R.S., F.L.S., will lecture on "Variegated Foliage."

September 27, British Floral Art Diploma Written Examination.

September 29, 30, and October 1.—Great Autumn Show in the National Hall, Olympia, W. 14. See special notice, p. cxxxvii.

October 12, 12 noon to 7.30 P.M.—Fortnightly Meeting and Show of Flowers in season in the New Hall.

October 12, 1 to 7.30 P.M.—Fruit and Vegetable Show in the Old Hall. At this Show there will be a special exhibit from Wisley of Pests and Diseases which attack Fruit and Vegetables.

At 3.30 P.M. in the Lecture Room of the New Hall, on *October 12*, Mr. E. A. Bunyard, F.L.S., will lecture on "The History and Cultivation of Peaches and Nectarines."

October 13, 10 A.M. to 4 P.M.—Fortnightly Meeting and Fruit and Vegetable Shows, continued.

October 20 and 21, British Floral Art Diploma Practical Examination.

October 26, 12 noon to 7.30 P.M.—Fortnightly Meeting and Show of Orchids, Stove and Greenhouse Plants and Berried Shrubs.

At 3.30 P.M. in the Lecture Room of the New Hall, on *October 26*, Sir Jeremiah Colman, Bart., D.L., V.M.H., will lecture on "Orchids."

At 4.30 P.M. in the Restaurant of the Old Hall, on *October 26*, there will be a Lily Group Discussion on "Hybrid Lilies." See below.

October 27, 10 A.M. to 4 P.M.—Fortnightly Show, continued.

HALL LETTINGS.

From *September 16 to 25* the Model Engineering Exhibition will be held in the Society's Old Hall. Anyone interested in the exhibition is asked to apply to the organizers, Messrs. P. Marshall & Co., 13-16 Fisher Street, London, W.C. 1, for full particulars.

From *October 18 to 22* the Medical Exhibition will be held in the New Hall, and interested persons are asked to apply to the organizer, R. S. Ely, Esq., 194-200 Bishopsgate, London, E.C. 2, for particulars.

SILVER TROPHY FOR CACTI AND SUCCULENTS.

A Silver Trophy, provided from Mrs. Sherman Hoyt's Prize Fund, is offered for award at the Fortnightly Show on *September 14* for the best group of Cacti and/or succulents staged by an amateur. Entries should be made on special forms obtainable from the Secretary, by whom the completed forms should be received not later than by the first post on Wednesday, *September 8*.

SEWELL MEDAL COMPETITION.

At the Fortnightly Show on *September 14* the last Sewell Medal Competition of the year will take place. This Medal, which is struck in Gold, is awarded for exhibits of plants suitable for the rock garden or alpine house, and on this occasion one medal is offered for an amateur's exhibit and one for a horticultural trader's. Each amateur's exhibit must consist of three, and each horticultural trader's of six, pots or pans not exceeding 12 inches in diameter if circular, or 112 square inches in internal area if rectangular, and only one subject should be shown in each pot or pan. It is not necessary that the plants should have been grown in the receptacles in which they are shown and, if desired, plants may be lifted and potted for the purposes of the competition. Not fewer than two-thirds of the plants in each exhibit must be in bloom, and plants which are not in bloom should possess decorative value when shown. The scale of points for judging will be as follows: Suitability, 24 points; Rarity, 18 points; Cultivation, 24 points. Entries should be made on special forms which are obtainable from the Secretary, by whom the completed forms must be received not later than by the first post on Wednesday, *September 8*.

LILY GROUP.

The Lily Group consists of Fellows and Associates of the Royal Horticultural Society who are especially interested in Lilies, *Nomocharis* and *Fritillaries*. Its object is to provide members with facilities for meeting to exchange views upon

CXL PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

these plants. Those who wish to join should apply in writing to the Secretary, who notifies members by post of all meetings.

The last meeting of the year will take place on *October 26*, in the Restaurant of the Old Hall, when there will be a discussion on "Hybrid Lilies." All members are cordially invited to take part in the discussion and to bring plants, cut blooms, photographs or lantern slides bearing upon the subject. Inquiries from beginners are always welcomed.

INTERNATIONAL EXHIBITION OF GARDEN ARCHITECTURE.

An Exhibition of Garden Art is to be held from *April 15 to July 15, 1938*, in Geneva under the chairmanship of M. Fernand E. Correvon and with the title "Exposition Internationale de l'Art des Jardins, des Cimetières et d'Urbanisme." M. E. Chouet of 1 rue du Cloître, Geneva, Switzerland, is the Secretary.

HORTICULTURAL COLOUR CHART.

Owing to the vast amount of work involved in the compilation of the Horticultural Colour Chart it has not been possible to publish it as soon as had been anticipated. The work on the Chart is, however, progressing, and the first volume will appear at the earliest possible moment.

Anyone desiring further particulars about this Chart is asked to write to the Secretary. Applications for the first volume at the price of 10s. a copy, exclusive of postage, will be accepted up to the date of publication. After publication copies will only be available at that price until the Society's limited stock is exhausted, when the price will be £1 1s. a copy.

THE GARDENS AT BODNANT.

Fellows visiting North Wales will be glad to know that the Gardens at Bodnant, Tal-y-Cafn, North Wales, are, by Lord Aberconway's permission, open to Fellows of the Society without charge on Tuesday and Friday afternoons throughout the summer from 2 to 5 P.M.

GREY SQUIRRELS.

An Order under the Destructive Imported Animals Act, 1932, has been made by the Minister of Agriculture and Fisheries and the Secretary of State for Scotland, acting jointly, known as The Grey Squirrels (Prohibition of Importation and Keeping) Order, 1937, applying the provisions of that Act to the grey squirrel. The Order, which has now been approved by both Houses of Parliament, came into force on July 31, 1937.

The effect of the Order will be to place the grey squirrel in the same category as the musk rat so far as prohibition of importation and keeping is concerned. So far as is known the animal is not, in fact, imported and kept for profit, but in reaching the decision to make the Order the Minister and the Secretary of State have been guided by the view that "keeping" connotes some deliberate act done by a person for the purpose of, and having the effect of, inducing grey squirrels to remain upon his land, whether in captivity or not, but the omission by a person to take steps to destroy grey squirrels which come upon his land does not by itself constitute "keeping."

The intention of the Order is to facilitate voluntary measures of control of the pest, and it is unlikely that the power of entry on land which is conferred by the making of the Order will actually be exercised unless voluntary measures prove inadequate.

Practical and scientific opinions unite in condemning the grey squirrel as a menace and an increasing menace. It lives upon green shoots and buds, nuts and seeds, fruits, the inner bark of young trees, bulbs and roots, birds' eggs and young birds. There are, therefore, few branches of agriculture which do not suffer from its depredations, and few parts of the country in which it cannot find the food it requires. Although at the present time it is not found everywhere in Great Britain, it has already colonized a very large area.

It is hoped that all those on whose land it is prevalent will be prepared to co-operate in a campaign to secure the elimination of this pest.

PICTURES, PLANS, PHOTOGRAPHS, ETC.

With the approach of winter, space will be available at Fortnightly Shows for pictures and photographs of plants, flowers and gardens, and for plans or models of gardens. Regulations with regard to these exhibits may be had on

application to the Secretary. The dates of the Shows when these exhibits are permitted are *November 9, 30, December 14, 1937, and January 11, 25, February 8 and 22, 1938.*

HORTICULTURAL SUNDRIES.

The exhibition of Horticultural Sundries will be allowed at the Fortnightly Shows on *December 14, 1937, and January 11 and 25, 1938.* If space is available, sundries will also be admitted on *November 30.*

INSPECTION OF GARDENS.

Many Fellows may not be aware of the terms under which their gardens can be inspected by the Society's Garden Inspector, and advice given thereon. They are set out below, and it will be seen that special arrangements can be made when Fellows living in the same district co-operate.

"The inspection of Gardens belonging to Fellows is conducted by a thoroughly competent Inspector from the Society who reports and advises at the following cost, viz.: a fee of £3 3s. for one day, or £5 5s. for two consecutive days, together with all out-of-pocket expenses. No inspection may occupy more than two days, save by special arrangement. Should two or more Fellows residing in the same district, with their gardens within easy reach of one another, desire to have the services of the Garden Inspector, arrangements will be made for such a combined inspection and the fee and expenses divided by consent of those concerned. Fellows wishing for the services of an Inspector are requested to give at least a week's notice and choice of two or three days, and to indicate the most convenient railway station and its distance from their Garden. Gardens can only be inspected at the *written* request of the owner."

FRUIT FOR NAMING.

At this time of the year there is always a large amount of fruit sent to the Committee for naming, and Fellows are reminded of the following instructions which, if adhered to, will materially assist the Committee in their task of identification, and thus save Fellows from being disappointed owing to the Committee being unable to identify the fruit from the samples sent.

"Send at least three perfect specimens of a variety. Do not send until the fruits are mature, and then choose specimens representative of the particular variety. Avoid sending bruised, diseased or abnormal fruits. Include with each variety a typical shoot with foliage. Number each variety, preferably in Roman figures, by marking the skin with a hard pencil, and keep a record of the tree from which it is gathered. Labels are often displaced during transit. Wrap each fruit in paper and pack it carefully and securely in wood-wool or similar material. Flimsy cardboard boxes are usually crushed in the post, while scented-soap boxes taint the fruit and obscure the characteristic flavour. Give all the information you can respecting the age of the trees and how they are grown, *e.g.* indoors or out, as cordons, bushes, or standards, etc."

It is a convenience if specimens are sent so as to reach the office by the first post on the Monday preceding a Fortnightly Show.

WISLEY IN SEPTEMBER.

Trials and Collections.—The Dahlias and Michaelmas Daisies take pride of place, but in addition shrubby Fuchsias, Roses, and possibly late Annual flowers will also brighten this part of the Gardens. Of the Dahlias on trial there are 257 varieties, and of Michaelmas Daisies 109. The collection of Gazanias beside the alpine house forms a cheerful sight on sunny days.

In the Rock Garden the most interesting and showy plants are the several Chinese species of Gentian and Cyananthus, which flower from the early autumn until frost puts an end to most of them. *Roscoea purpurea pallida* is uncommon in appearance and welcome at this late season; the first of the autumn-flowering species of Crocus and Cyclamen will come, as well as the Colchicums, of which the loveliest is the snowy *C. speciosum album*.

Wild Garden.—Of the shrubs only *Cyrilla racemiflora*, with its long creamy tassels, and *Hydrangea paniculata grandiflora* remain in bloom now, but the tall Willow Gentian (*Gentiana asclepiadea*) in large patches, pink or white *Cyclamen neapolitanum*, and perhaps belated Tiger Lilies and the scarlet *Tropaeolum*

speciosum climbing through the Azaleas lend colour to the woodland, and there is the autumnal foliage of the *Enkianthus* or *Vacciniums*.

Seven Acres.—The heath garden is especially gay at this time with many varieties and forms of the Cornish, Bell, Connemara, and Cross-leaved Heaths, forming with the Common Ling wide patches of colour, and a mosaic pattern of foliage and drying seed heads. Except for *Buddleia Fallowiana*, with its grey-flannel leaves and lavender spikes, there will be few shrubs in bloom in Seven Acres, but quite a number in fruit, of which the Crab Apples, Barberries, Coton-easters, and *Pyracantha Rogersiana* in several colour varieties are the chief. October is, however, usually the best month in which to see these.

The species of *Rosa* in Howard's Field may be reached by the walk along the river bank, and are likely to be exceptionally well-fruited this year, their decorative season extending from August until Christmas.

Award of Garden Merit Garden.—An unusual evergreen shrub growing here is *Schima argentea*, related to the Camellias but, unlike them, flowering in the autumn, having clusters of white cups 2 inches wide. *Perowskia atriplicifolia* is another attractive shrub of a very different kind which is to be found here, preferring full sun and a dry well-drained situation.

Miscellaneous.—The herbaceous border will still have much colour and many plants to interest visitors, although at this end of the season there is a smaller number of plants available for the purposes of contrast and variety. By the end of the Peach Wall a collection of the large hybrid *Colchicums* is to be found, and in the Azalea Garden the beds of *Gentiana sino-ornata* make a dazzling sheet of blue (fig. 99). Several late-blooming shrubs worthy of notice are to be seen around the walls of the laboratory, including the double-flowered Pomegranate and *Abelia Schumannii*.

Greenhouses.—In the Temperate house the blue *Plumbago capensis* and climbing Morning-Glory (*Ipomaea Learii*), the orange-yellow shrubby *Cestrum Parqui*, bright red *Epacris ardentissima*, together with Fuchsias and Pelargoniums are likely to be the principal plants in flower, but late in the month may appear the royal purple blooms of *Tibouchina semidecandra*. In the smaller half-hardy house Nerines, *Leonotis Leonurus* with its rich orange whorls of blossoms (which also grows less vigorously outside one of the glasshouses), the charming pink *Stahce roseum*, and bushy yellow *Cuphea micropetala* make this one of the most interesting places in the Gardens.

NEW PUBLICATION.

The Royal Horticultural Society's Daffodil Year-Book for 1937 (Number 8 in the series) has just appeared. It contains articles on Daffodils and Daffodil growing at home and abroad, by, among others, Messrs. F. A. Secrett, G. L. Wilson, E. A. Bowles, Rev. T. Buncombe, Lady Moore, Dr. Sibyl Horner, Messrs. A. W. White, W. Jackson, F. J. Chittenden, Miss Hinchliff, Messrs. P. H. Gregory, L. N. Staniland, C. S. Radcliff and D. Tannock, Reports of Shows in England and the Dominions and many interesting notes. 154 pp. and 21 illustrations. 5s. paper, 6s. cloth. Post free from the R.H.S. Offices, Vincent Square, London, S.W. 1.

GENERAL MEETINGS.

JUNE 22, 1937 (*cont.*).

JOINT RHODODENDRON COMMITTEE.—Mr. E. H. WILDING in the Chair, and eight other members present.

Exhibit.

Messrs. G. Reuthe, Hardy Plant Nursery, Keston, Kent: *Rhododendron cinnabarinum blandfordiae* *florum*.

JULY 1, 1937.

BRITISH DELPHINIUM SOCIETY'S SHOW.

JOINT DELPHINIUM COMMITTEE.—Mr. C. F. LANGDON, V.M.H., in the Chair, and twelve other members present.

Awards Recommended:—*Cultural Commendation.*

To Messrs. Sutton, Seed Trial Grounds, Slough, for *Delphinium cardinale*.

Selected for trial at Wisley.

Delphinium belladonna 'Lugano,' from Mrs. de Neufville, 46 Whitehall Court, S.W. 1.

Delphinium 'Elizabeth,' from Mrs. Hugh Lang, Worplesdon Hill, Woking.

Delphinium 'Bluestone,' from Miss C. I. Marshall, Saltwood, Hythe, Kent.

Delphinium paniculatum, from Messrs. Sutton, Reading.

Delphinium 'Jean Smith,' from Messrs. Bees, Chester.

Other Exhibits.

Mrs. M. Finn, Lorenden, nr. Faversham: *Delphinium* 'Lorenden Double Mauve.'

Mrs. Hugh Lang, Woking: *Delphinium* 'Picotee.'

Messrs. Sutton, Reading: *Delphinium nudicaule* and *D. tatsienense*.

Messrs. Bees, Chester: *Delphinium* 'Wrexham Dandy Boy.'

JULY 6, 1937.

COMPETITIVE CLASSES FOR AMATEURS.

Lilies.

Class A.—Eight Species and/or Hybrids of *Lilium*, one stem of each, cut or on plant.

First Prize, 60s.

To Rt. Hon. Lord Swaythling, Southampton.

Second Prize, 45s.

To J. E. H. Stooke, Esq., Danesmere, Hereford.

Third Prize, 30s.

To Lady Beatrix Stanley, C.B.E., C.I., Market Harborough.

Class B.—One stem of *Lilium*, cut or on plant.

First Prize, 20s.

To Miss P. Dimsdale, Lechlade, Glos.

Second Prize, 15s.

To Rt. Hon. Lord Swaythling, Southampton.

Third Prize, 10s.

To J. G. Vautier, Esq., Beckenham.

SCIENTIFIC COMMITTEE.—Mr. E. A. BOWLES, M.A., F.L.S., F.R.E.S., V.M.H., in the Chair, and seven other members present.

Sanderara × 'Alpha.'—The Committee unanimously recommended a Certificate of Appreciation to Mr. A. Ruck, of Messrs. Sanders, for his work in raising the new and interesting trigeneric hybrid between *Brassia*, *Cochlidia* and *Odontoglossum*.

Celastrus angulatus.—Mr. Jackson drew attention to a flowering plant of *Celastrus angulatus* from Woburn Abbey Gardens. It is a large-leaved species, introduced by Wilson from China.

Caragana arborescens.—Mr. Odell showed specimens of this Siberian species from Alberta, where it is much grown for hedges and shelter.

Campanula Medium virescent.—Mr. Bowles showed, on behalf of Prof. Weiss, a curious virescent flower of Canterbury Bell from Prof. Weiss's garden at Merrow.

Lilium candidum × *L. testaceum*.—He also showed photographs of crosses between *Lilium candidum* and *L. testaceum* raised by Mr. Boyes of Cambridge, who was attempting to save seed of the crossed plants.

FRUIT AND VEGETABLE COMMITTEE.—Mr. E. A. BUNYARD, F.L.S., in the Chair, and nine other members present.

Awards Recommended :—

Silver-gilt Hogg Medal.

To Messrs. T. Rivers, Sawbridgeworth, Herts, for fruit trees in pots.

Other Exhibits.

Mr. A. Corderoy, 46 Footscray Road, Eltham, S.E. 9 : Seedling Raspberry.

R.H.S. Commercial Fruit Trials : Raspberries 'Allenberry,' 'Brocket Hall,' 'Duke of Cornwall,' 'Epicure,' 'Red Cross,' 'Reward.'

FLORAL COMMITTEE A.—Mr. J. M. BRIDGEFORD in the Chair, and sixteen other members present.

Awards Recommended :—

Silver Flora Medal.

To Messrs. Barr, Taplow, for herbaceous plants.

To Messrs. Dobbie, Edinburgh, for Roses.

To Mr. J. Douglas, Great Bookham, for Border Carnations.

To Messrs. Hillier, Winchester, for herbaceous plants and shrubs.

To Messrs. Waterer, Sons & Crisp, Twyford, for Water Lilies and waterside plants.

Silver Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Border Carnations.

To Messrs. Bath, Wisbech, for Pæonies, Delphiniums and Lilies.

To Messrs. Engelmann, Saffron Walden, for Carnations and Lilies.

To Messrs. Gibson, Cranleigh, for Border Carnations.

To Mr. E. Ladhams, Elstead, for herbaceous plants.

Flora Medal.

To Messrs. B. R. Cant, Colchester, for Roses.

To Messrs. Kelway, Langport, for Pæonies and other herbaceous plants.

Banksian Medal.

To Mr. W. E. B. Archer and Daughter, Sellindge, for Roses.

To Messrs. Bentall, Havering, for Roses.

To Mr. W. Braithwaite, Leeming Bar, for Scabious.

To Messrs. Carlile, Twyford, for herbaceous plants.

To Messrs. Clark, Dover, for Alstroemerias.

To Mr. E. B. Le Grice, North Walsham, for Roses.

To Mr. A. Miles, Bicklet, for herbaceous plants.

To Mr. A. Perry, Enfield, for Hemerocallis and varieties of *Chrysanthemum maximum*.

To Messrs. Prichard, Christchurch, for herbaceous plants.

To Messrs. Wheatcroft, Nottingham, for Roses.

To G. Yeld, Esq., V.M.H., Gerrards Cross, for Hemerocallis.

Award of Merit.

To *Chrysanthemum maximum* 'Horace Read,' for cutting and market (votes unanimous), from Messrs. Daniels, Norwich. See p. 413.

To *Helenium* 'The Bishop,' as a hardy border plant (votes 11 for), from Messrs. Carlile, Twyford. See p. 413.

Selected for trial at Wisley.

Coreopsis 'Brentwood Glory,' from Mr. J. T. West, Brentwood.

Delphinium seedling from Miss A. Wilson, Weybridge.

Other Exhibits.

Lady Bourdillon, Liphook : *Anchusa italica* 'Westacre.'

Misses Hopkins, Coulsdon : herbaceous plants.

Messrs. Letchworth Plants, Ltd., Letchworth : herbaceous plants.

B. W. Pettitt, Esq., Sible Hedingham : *Delphinium* 'Berwinpet.'

Mr. H. Robinson, Hinckley : Rose 'Walter Bentley.'

FLORAL COMMITTEE B.—Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and twenty-two other members present.

Awards Recommended :—

Gold Medal.

To Messrs. Constable, Southborough, for Lilies.

To Messrs. Wallace, Tunbridge Wells, for Lilies and other herbaceous plants.

Silver Flora Medal.

To Knap Hill Nursery, Woking, for Lilies, Irises and hardy ferns.

Silver Banksian Medal.

To Messrs. Russell, Windlesham, for greenhouse plants.

Flora Medal.

To Messrs. Bunyard, Maidstone, for species and old varieties of Rose.

To Mr. A. Hansen, New Barnet, for rock garden plants.

Banksian Medal.

To Messrs. Burkwood & Skipwith, Kingston, for flowering shrubs.

To Mr. A. Corderoy, Eltham, for rock garden plants.

To Messrs. Garway, London, W. 1, for succulents.

To Hocker Edge Gardens, Cranbrook, for Lilies and other hardy plants.

To Messrs. Redgrove & Patrick, Sevenoaks, for rock garden plants.

To Mr. G. Welch, Cambridge, for rock garden plants.

Award of Merit.

To *Argemone hispida* as a hardy flowering plant (votes 11 for, 3 against), from T. Hay, Esq., Hyde Park, London, W. 2. See p. 412.

To *Jasminum* × *stephanense* as a hardy flowering shrub (votes 8 for), from Mr. R. C. Notcutt, Woodbridge. See p. 413.

To *Lilium* × *Manglesii*, Stooke's variety, as a hardy flowering plant (votes 14 for), from J. E. H. Stooke, Esq., Hereford. See p. 413.

To *Lilium* × 'Orange King' as a hardy flowering plant (votes unanimous), from J. E. H. Stooke, Esq., Hereford. See p. 414.

To *Lonicera* × *grata* as a hardy flowering shrub (votes 11 for), from Mr. R. C. Notcutt, Woodbridge. See p. 414.

To *Phlox maculata* as a hardy flowering plant (votes 7 for, 1 against), from T. Hay, Esq., Hyde Park, London, W. 2. See p. 414.

Preliminary Commendation.

To *Lilium* × *crovidii* as a hardy flowering plant (votes 13 for, 3 against), from J. E. H. Stooke, Esq., Hereford.

To *Lilium taliense* as a hardy flowering plant (votes unanimous), from Lt.-Col. L. C. R. Messel, O.B.E., Handcross.

To *Watsonia* sp. as a hardy flowering plant (votes 9 for, 1 against), from the Viscountess Byng of Vimy, Thorpe-le-Soken.

Other Exhibits.

The Duke of Bedford, Woburn : *Celastrus angulatus*.

Miss P. Dimsdale, Lechlade : *Salvia bicolor*.

Messrs. Elliott, Stevenage : *Phlox* var.

T. Hay, Esq., Hyde Park, W. 2 : *Cirsium Velenovskyi*.

Mrs. John Holden, Newbury : *Salvia Sclarea*.

Mr. E. Ladhams, Elstead : *Salvia bicolor*.

Mr. W. J. Marchant, Wimborne : *Indigofera* sp.

Mr. R. C. Notcutt, Woodbridge : *Deutzia seichuenensis*.

Major F. C. Stern, Goring-by-Sea : *Lilium* × 'Sunstar.'

J. E. H. Stooke, Esq., Hereford : Lily hybrids.

Mrs. C. M. Whittall, Haslemere : *Lilium croceum*.

Mr. R. Colpoys Wood, West Drayton : hardy plants.

ORCHID COMMITTEE.—Sir JEREMIAH COLMAN, Bart., in the Chair, and twelve other members present.

Awards Recommended :—

Preliminary Commendation.

To *Sanderara* × 'Alpha' (*Brassia Lawrenceana* × *Odontioda* × 'Grenadier') (votes 11 for, 1 against), from Messrs. Sanders, St. Albans. See p. cxliii.

Other Exhibits.

Messrs. Charlesworth, Haywards Heath : a group of Orchids.

Messrs. Armstrong & Brown, Tunbridge Wells : a group of Orchids.

N. Prinsep, Esq., Pevensey Bay : *Laslocattleya* × 'Lorna.'

cxlvi PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

JOINT BORDER CARNATION COMMITTEE.—Mr. J. M. BRIDGFORD in the Chair, and seven other members present.

Selected for trial at Wisley.

Border Carnation 'Mrs. Thorburn,' from Mr. J. J. Keen, The Avenue, Southampton.

Perpetual Border Carnations 'Sussex Haze,' 'Sussex Hawk' and 'Sussex Gem,' also Border Carnations 'Talisman,' 'Silver Star' and 'Sunbeam,' all from Messrs. Allwood Bros., Wivelsfield Nurseries, Haywards Heath.

Border Carnation 'Limpsfield Scarlet,' from E. C. Charrington, Esq., Icewood Cottage, Limpsfield.

Other Exhibits.

Messrs. Allwood Bros. : Border Carnations 'Sussex Maroon,' 'Sincerity' and 'Golden Marvel.'

E. C. Charrington, Esq. : Border Carnation 'Duchess of Kent.'

JOINT ROCK GARDEN PLANT COMMITTEE.—Major F. C. STERN, F.L.S., in the Chair, and nine other members present.

Awards Recommended :—

Award of Merit.

To *Allium sikkimense* as a hardy flowering bulbous plant (votes 6 for), from Miss D. C. Hopton, Hereford. See p. 412.

To *Campanula arvensis* alba as a hardy rock garden or alpine house plant (votes 7 for), from Mr. Clarence Elliott, Stevenage. See p. 412.

To *Campanula* × 'Clarence Elliott' as a hardy rock garden or alpine house plant (votes 7 for), from Mr. Clarence Elliott. See p. 412.

To *Cornus canadensis* as a hardy rock garden plant (votes 8 for), from Mr. W. J. Marchant, Keeper's Hill Nursery, Staplehill, nr. Wimborne. See p. 413.

To *Crepis incana* as a flowering plant for the rock garden or alpine house (votes 8 for), from Mr. H. S. Bootham, Nightingale Nursery, nr. Maidenhead. See p. 413.

To *Hypericum empetrifolium* as a flowering plant for the rock garden or alpine house (votes 7 for, 1 against), from Mr. G. P. Baker, Sevenoaks, and Dr. P. L. Giuseppe, Felixstowe. See p. 413.

To *Philesia buxifolia* as a hardy flowering shrub for the rock garden (votes 8 for), from Dr. P. L. Giuseppe. See p. 414.

To *Saxifraga squarrosa* as a hardy flowering plant for the rock garden or alpine house (votes 7 for), from Mr. P. Rosenheim, East Molesey. See p. 415.

Cultural Commendation.

To Mr. P. Rosenheim, for a specimen of *Saxifraga squarrosa* collected in the Dolomites in 1921.

Other Exhibits.

Mr. H. S. Boothman, Maidenhead : *Anthyllis Hermanniae*, *Campanula malacitana*, *C. × rotundifolia*, *Cotyledon Pestalozzae*, *Teucrium Achermannii*.

Mrs. A. N. Griffith, Newnham, Cambridge : *Gaultheria nummularioides* var. F. 2522, *G. thibetica*, *G. trichophylla*, *Sempervivum ornatum*, *Campanula malacitana*.

Dr. P. L. Giuseppe, Felixstowe : *Anagallis alternifolia*, *Helichrysum frigidum*, *Hypericum cuneatum*.

Miss D. C. Hopton, Hereford : *Thymus membranaceus*.

Mrs. Milford, Chedworth, Glos. : *Dianthus basuticus*.

Miss Savory, Olney, Bucks : *Dipcadi serotinum*, *Sempervivum Allionii*.

Mr. G. Woodhouse, 57 Pembury Road, N. 17 : *Cuthbertia graminea*.

JULY 10, 1937.

JOINT DELPHINIUM COMMITTEE.—At Delphinium Society's Show, Alderley and Wilmslow, Cheshire.—Mr. C. F. LANGDON in the Chair, and seven other members present.

Exhibits.

Messrs. Caldwell, Knutsford : Delphinium seedling.

Miss R. K. Thompson, Knapton Lodge, Thirsk, Yorks : Delphinium seedlings.

JULY 13, 1937.

JOINT BORDER CARNATION COMMITTEE.—National Carnation and Picotee Society's Show.—Mr. J. M. BRIDGFORD in the Chair, and eleven other members present.

Preliminary Commendation.

Border Carnations 'Vanity' and 'Firetail Clove,' from Messrs. Allwood Bros., Wivelsfield Nurseries, Haywards Heath.

Border Carnation 'Coronation Scarlet,' from S. Maxfield, Esq., Stone Street, Gravesend.

Border Carnation 'Maisie Thorburn,' from Wm. Thorburn, Esq., East Cowes, Isle of Wight.

Selected for trial at Wisley.

Border Carnations 'Dream,' 'Suzette,' 'Red Rover,' 'Vanity,' 'Firetail Clove,' 'Darkee,' and Perpetual Border Carnation 'Sussex Beauty,' all from Messrs. Allwood Bros.

Border Carnation 'Ena Elliott,' from H. A. Knapton, Esq., Orpington.

Border Carnation 'Coronation Scarlet,' from S. Maxfield, Esq.

Border Carnation 'Seedling No. 1,' from E. Baldry, Esq., Croppath Road, Dagenham, Essex.

Border Carnations 'R. J. Day' and 'Maisie Thorburn,' from Wm. Thorburn, Esq.

Border Carnation 'Margaret Day,' from J. J. Keen, Esq., Southampton.

Border Carnation 'G. D. Murray,' from R. Thain, Esq., Guildford.

Other Exhibits.

Messrs. Allwood Bros.: Border Carnations 'Quaker Maid,' Seedlings B. 79/1, B. 79/C., 'Speckles,' and Perpetual Border Carnation 'Sussex Scarlet.'

E. V. Brain, Esq., Crown Hill, Upper Norwood, London: Border Carnations 'Duchess of Kent,' 'Blue Horizon' and 'Duke of Windsor.'

F. W. Nicholls, Esq., Woodrode Road, Woolton, Liverpool: Border Carnation 'Woolton Clove.'

C. S. Cox, Esq., Langley Road, Langley: Border Carnation 'Thora Cox.'

E. T. Turner, Esq., Victoria Road, Maldon, Essex: Border Carnation 'Florence Turner' (already in the Wisley trials).

H. A. Knapton, Esq., Orpington: Border Carnations 'Ruth Sparey' and 'Winifred Knapton.'

S. Maxfield, Esq., Gravesend: Border Carnation 'Singlewell Clove.'

C. F. Hill, Esq., Carlton Road, Smallheath, Birmingham: Border Carnation 'F. W. Hill.'

E. Baldry, Esq., Dagenham, Essex: Border Carnation seedlings.

JULY 20, 1937.

COMPETITIVE CLASSES FOR AMATEURS.

Hardy Flowers.

Class A.—Twelve kinds of Hardy Flowers, one vase of each.

First Prize, 60s.

To Rt. Hon. Lord Swaythling, Southampton.

Second Prize, 45s.

To J. G. Vautier, Esq., Beckenham.

Class B.—One vase of a Hardy Flower.

First Prize, 20s.

To Rt. Hon. Lord Swaythling, Southampton.

Second Prize, 15s.

To J. G. Vautier, Esq., Beckenham.

Third Prize, 10s.

To Miss M. Hancock, East Finchley.

A lecture was given by Major G. CHURCHER on "The Modern Gladiolus." Chairman, Mr. G. W. LEAK, V.M.H.

NEW HYBRID LILY COMPETITION.

The Banksian Medal for the best hybrid Lily exhibited at the Fortnightly Show on July 6, or the Fortnightly Show on July 20, which had not received a Certificate of Preliminary Commendation, an Award of Merit, or a First Class Certificate beforehand, was awarded to J. E. H. Stooke, Esq., Danesmere, Hereford, who exhibited *Lilium* × *Manglesii* Stooke's variety (see p. 413).

SCIENTIFIC COMMITTEE.—Mr. E. A. BOWLES, M.A., F.L.S., F.R.E.S., V.M.H., in the Chair, and four other members present.

Death of Professor H. Armstrong, F.R.S.—The Chairman referred to the death of Professor Henry Armstrong, who had been a member of the Committee for

many years, and moved a vote of sympathy and condolence with his relatives. This was unanimously agreed to.

Azalea gall.—Mr. Odell showed an *Azalea* attacked by the well-known gall due to the fungus *Exobasidium Rhododendri*.

Branching grass.—Dr. Voelcker showed an illustration of an oat-like grass with a branching stem, and undertook to obtain further particulars.

FRUIT AND VEGETABLE COMMITTEE.—Mr. E. A. BUNYARD, F.L.S., in the Chair, and nine other members present.

Awards Recommended :—

Silver Hogg Medal.

To Messrs. J. C. Allgrove, Middle Green, Langley, Slough, for a collection of Gooseberries, Red and White Currants.

Other Exhibits.

Oranges from the South African Fruit in Season Exhibit, staged by the Imperial Fruit Show, Ltd.

R.H.S. Commercial Fruit Trials, Wisley: Raspberries 'Newburgh' and 'Taylor,' Currant 'Pink Perfection,' Plum 'Early Laxton.'

Mr. B. Smith, Vale View, Redhill: seedling Cherry.

FLORAL COMMITTEE A.—Mr. J. M. BRIDGEFORD in the Chair, and thirteen other members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. Daniels, Norwich, for Larkspurs.

Silver Flora Medal.

To Messrs. Blackmore & Langdon, Bath, for Phlox.

To Messrs. A. Dickson, Newtownards, for Roses.

Silver Banksian Medal.

To Messrs. Barr, Taplow, for herbaceous plants.

To Mr. F. J. Bell, Whitley Bay, for Violas and Pansies.

To Messrs. F. Cant, Colchester, for Roses.

To Messrs. Engelmann, Saffron Walden, for Carnations.

To Mr. E. Ladhams, Elstead, for herbaceous plants.

To Mr. R. C. Notcutt, Woodbridge, for herbaceous plants.

To Mr. A. Perry, Enfield, for Hemerocallis.

To Messrs. Prichard, Christchurch, for herbaceous plants.

To Messrs. Stark, Fakenham, for annuals and herbaceous plants.

Flora Medal.

To Messrs. Allwood, Haywards Heath, for Carnations and Pinks.

To Messrs. Bentall, Havering, for Roses.

To Messrs. B. R. Cant, Colchester, for Roses.

To Mr. J. F. Cumming, Wisbech, for Scabious and other herbaceous plants.

To Mr. E. B. Le Grice, North Walsham, for Roses.

To Messrs. McGredy, Portadown, for Roses.

To Messrs. Stewart, Ferndown, for herbaceous plants.

To Messrs. Wheatcroft, Nottingham, for Roses.

Banksian Medal.

To Mr. W. E. B. Archer & Daughter, Sellindge, for Roses.

To Messrs. T. Carlile, Twyford, for herbaceous plants.

To Cobham Hall Estate, Cobham, for Phloxes.

To Messrs. Forbes, Hawick, for Delphiniums, Pentstemons, etc.

To Marsden Nursery, Ashted, for *Delphinium Belladonna* and other hardy plants.

To Mr. A. Miles, Bickley, for herbaceous plants.

To Mr. A. Perry, Enfield, for herbaceous plants.

To Messrs. Spencer, Hockley, for Dahlias.

Award of Merit.

To *Campanula carpatica* 'Slaugham White' as a hardy border plant (votes 10 for), from Mrs. Cuthbert Blundell, Haywards Heath. See p. 412.

To Rose 'Orange Triumph' (votes 11 for), from Messrs. Henry Morse, Brundall. See p. 415.

To Rose 'Poulsen's Yellow' (votes unanimous), from Messrs. McGredy, Portadown. See p. 415.

*Selected for trial at Wisley.**Tradescantia* 'Osprey,' from Messrs. Prichard, Christchurch.*Veronica* 'Wendy,' from Messrs. T. Carlile, Twyford.**Other Exhibits.**

Misses Hopkins, Coulsdon : herbaceous plants.

Letchworth Plants, Ltd., Letchworth : *Lythrum* 'Rose of Letchworth.'Mr. H. G. Longford, Abingdon : *Antirrhinum* 'Coral Splendour.'

Messrs. Henry Morse, Brundall : Roses.

Messrs. Wheatcroft, Nottingham : Roses 'Girona' and 'Lady Nutting.'

FLORAL COMMITTEE B.—Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and ten other members present.**Awards Recommended :—***Silver Banksian Medal.*

To Messrs. Russell, Windlesham, for greenhouse plants.

Flora Medal.

To Messrs. Prichard, Christchurch, for rock garden plants.

Banksian Medal.

To Messrs. Bunyard, Maidstone, for old varieties of Rose.

To Messrs. Garway, London, W. 1, for succulents.

To Mr. L. Lawrence, Taplow, for succulents.

To Mr. G. Welch, Cambridge, for rock garden plants.

To Mr. R. Colpoys Wood, West Drayton, for flowering shrubs.

To Messrs. Yano, London, W. 1, for dwarf shrubs in bowls.

*Award of Merit.*To *Campanula incurva* as a hardy flowering plant (votes 8 for), from the Director, Royal Botanic Gardens, Kew. See p. 412.To *Nymphaea* 'Rose Arey' as a hardy aquatic flowering plant (votes 10 for), from the Rt. Hon. the Earl of Jersey, Isleworth. See p. 414.To *Rhus Cotinus purpureus*, Notcutt's variety, as a hardy ornamental-foliaged shrub (votes 7 for), from Mr. R. C. Notcutt, Woodbridge. See p. 415.To *Magnolia sinensis* × *Wilsonii* ? as a hardy flowering shrub (votes unanimous), from Major F. C. Stern, M.C., Goring-by-Sea. This award was recommended, subject to revision of the name, on May 25, 1937, when the plant was shown as *M. globosa*. See p. 414.*Preliminary Commendation.*To *Gaultheria Merrilliana* as a hardy ornamental-fruited shrub (votes unanimous), from Lionel de Rothschild, Esq., Exbury.**Other Exhibits.**

Mr. A. Corderoy, Eltham : rock garden plants.

Messrs. Elliott, Stevenage : *Lavandula Spica rosea*.T. Hay, Esq., Hyde Park, London, W. 2 : *Acanthus Perringii*, *Malva umbellata*.Lord Horder, Petersfield : *Escallonia revoluta*, *Tricuspidaria lanceolata*.Mr. E. Ladhams, Elstead : *Campanula longestyla*.Messrs. Russell, Windlesham : *Ananas sativa variegata*.Major F. C. Stern, Goring-by-Sea : *Azara lanceolata*.W. Whitaker, Esq., Lymington : *Feijowa Sellowiana*.**ORCHID COMMITTEE.**—Sir JEREMIAH COLMAN, Bart., in the Chair, and twelve other members present.**Exhibits.**

Messrs. Charlesworth, Haywards Heath : a group.

Messrs. Sanders, St. Albans : *Dendrobium regium*.**JOINT BORDER CARNATION COMMITTEE.**—Mr. J. M. BRIDGEFORD in the Chair, and seven other members present.*First Class Certificate.*

To Border Carnation 'Harmony' (votes unanimous), from Messrs. Allwood Bros., Wivelsfield Nurseries, Haywards Heath. See p. 412.

Preliminary Commendation.

To Border Carnation 'Limpfield White,' from E. Charrington, Esq., Icewood Cottage, Limpfield.

c] PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

Selected for trial at Wisley.

Perpetual Border Carnations 'Sussex Red' and 'Sussex White,' Border Carnations 'Cottage Wonder,' 'Cottage Gem' and 'Cottage Warrior,' from Messrs. Allwood Bros., Haywards Heath.

Border Carnations 'Harriet Harrow,' 'Frances Kinnaird' and 'Limpsfield White,' from E. Charrington, Esq., Limpsfield.

Other Exhibits.

Messrs. Allwood Bros., Haywards Heath, Sussex: Perpetual Border Carnations 'Sussex Salmon,' 'Sussex Surprise' and 'Sussex Glory,' Border Carnations 'Cottage Maid' and 'Sincerity.'

JOINT ROCK GARDEN PLANT COMMITTEE.—Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and six other members present.

Exhibits.

Lionel de Rothschild, Esq., Exbury: *Gentiana sp.* K.W. 10807.

Richard Seligman, Esq., Wimbledon: *Leucanthemum depressum.*

The Director, R.H.S. Gardens, Wisley: *Carlina acaulis* var. *caulescens.*

JULY 27, 1937.

JOINT BORDER CARNATION AND PICOTEE COMMITTEE.—Mr. E. CHARRINGTON in the Chair, and five other members present.

Exhibit.

Mrs. M. F. Taffs, 35 Carson Road, West Dulwich: Border Carnation seedling

DONATIONS TO THE SOCIETY'S GARDENS AT WISLEY, 1936.

(Continued from p. c.)

TALLANT, Miss, Ottery St. Mary, Devon; seeds of (?) *Cytisus monspessulanus*. TASCHKENT BOTANIC GARDEN, U.S.S.R.; collection of seeds, chiefly species of *Eremurus*, *Fritillaria*, *Iris*, and *Tulipa*. THERKILDSEN, K., Southport; plant of *Veronica prostrata* 'Miss Holt.' THOMAS, G. W., Trengwainton Gardens, Penzance; bulbs of *Notholirion*; plants of *Rhododendron Cubittii* and *Eucriphia Billardieri* var. *Milliganii*. THOMPSON, Mrs., Weybridge, Surrey; plant of *Rhododendron ficto-lacteum*; collection of seven *Semprevivum* species. THORRINGTON, F. W., Little Baddow, Chelmsford; cuttings of *Erysimum* × Wallflower. TIFLIS BOTANIC GARDEN, U.S.S.R.; collection of seeds. TIMIRJASEW ACADEMY, Moscow, U.S.S.R.; collection of seeds. TINCKER, Dr. M. A. H., Wisley; seeds of *Anona squamosa*. TOKYO, UNIVERSITY BOTANIC GARDEN, Japan; collection of seeds. TOULOUSE BOTANIC GARDEN, France; collection of seeds, chiefly trees and shrubs. TRACEY, Mrs., High Hall, Wimborne; seeds of *Scabiosa prolifera* and *Senecio cervilingua*. TROTTER, R. D., Ockley, Surrey; corms of *Crocus* species; seeds of *Crocus* and *Tulipa* species and other plants; collection of shrubs and rock plants; cuttings of *Arundinaria*. TUSON, Miss, Mayford, Woking; roots of *Gloriosa superba*. TWEEDALE, Mrs., Mayford, Woking; roots of *Habenaria* or *Satyrium* species. TYLER, R. C., Chaldon, Caterham; plant of *Campanula* × *rotarvatica*. VALENCIA, UNIVERSITY BOTANIC GARDEN, Spain; collection of seeds. VIENNA, BELVEDERE BOTANIC GARDEN; collection of seeds of rock plants. VILMORIN-ANDRIEUX ET CIE, Messrs., Verrières-le-Buisson, France; collection of seeds of shrubs. WAGENINGEN ARBORETUM, Holland; collection of tree and shrub seeds. WALEY, F. R., Sevenoaks; fruits of *Juglans nigra*. WALKDEN, Miss A., Sale, Cheshire; plants of *Solidago* 'Leraft.' WALKER, T. O., Carnforth, Lancs; plants of variegated *Armeria*, pink form of Lily-of-the-valley, and *Scopolia lurida* (?). WALL, J. T., Wisley; collection of rock plants from Switzerland and elsewhere. WALLACE, Messrs. R., Tunbridge Wells; bulbs of Lilies; plant of *Rosa Moyesii* 'Keeves Way.' WARBURG, Sir O., Headley, Epsom; plants of four species of *Acer*; seeds of *Gaultheria Cumingiana*. WARD, F. K.; collection of seeds from 1935 Expedition to N. Burma. WARRE, Capt. G., Roquebrune, France; seeds of *Oxyptalum caeruleum*; collection of shrub cuttings. WATERFIELD, Mrs., Great Bookham, Surrey; collections of plants and seeds from Gibraltar. WATT, J. C., Aberdeen; seeds of *Arisaema Jacquemontii*. WAUGH, Mrs. A., Silchester, Reading; plants of *Eucalyptus radiata* and *Nerine filifolia*. WAUGH, J., Wisbech; plants of Raspberry 'Doncaster.' WEBB, Miss, Knock, Belfast; seeds of *Codonopsis clematidea*. WEEKS, A. G., Limpsfield, Surrey; plants of Gentians, dwarf *Rhododendrons*, etc., for rock garden. WEISS, Prof. F. E., Merrow, Guildford; seeds of *Digitalis ferruginea* (?); books for the Library. WEST, J. T., Brentwood, Essex; plants of Lupins. WILKIN, H. T., Raynes Park, S.W. 20; seeds of *Adenium coetaneum*, *Polyanthus*, and *Zizania aquatica*; plants of *Astelma eximium*. WILLIAMS, C. T., Abbot's Leigh, Bristol; buds of *Malus coronaria*. WILLIAMS, J. E., Llandaff, Cardiff; seeds of *Anopterus glandulosa* and of plant from the Gold Coast. WINDIBANK, H., Haslemere; cuttings of *Perowskia atriplicifolia* and *Salvia involucrata* var. *Bethelii*. YASHIRODA, K., Kagawaka, Japan; seeds of rock plants. ZURICH, UNIVERSITY BOTANIC GARDEN; seeds of *Erysimum suffruticosum*; cuttings of *Oithonna carnosa*.

BOOKS ADDED TO THE LIBRARY, 1936.

(Continued from p. cxxxvi.)

- [Drawings, Coloured, of flowering plants.] Col. pls. fol. n.p., [17—] (C)
 [— of tropical or subtropical plants and insects.] fol. pls. fol. n.p., [18—]. (C)
 [— of flowering plants, chiefly indigenous to Hindustan, being a portion of the collection formed by JOHN STUART (1713–92), 3rd Earl of BUTE, scientifically arranged by THOMAS S. RALPH at South Lambeth in 1847.] 8 vols. Col. pls. fol. n.p., [17—]. (C)
 [— of plants and fruits done at Canton by Chinese artists for the Horticultural Society of London under the direction of JOHN REEVES.] 5 vols. Col. pls. fol. [Canton, c. 1817–24.] (C)
 [— of flowering plants, many on vellum, by G. D. EHRET, ? PETER WITHOUS and others, from the collection of JOHN STUART, 3rd Earl of BUTE.] Col. pls. fol. n.p., [? 16—–17—]. (C)
 [— of cultivated flowering plants, mostly tulips.] Col. pls. fol. n.d., [18th cent.] (C)
 [—] See AUBRIET, C.
 [—] See EHRET, G. D.
 [—] See [FLORE DU DESERT].
 [—] See HOLSTEYN, P.
 [—] See KOUWENHOORN, P. VAN.
 [—] See LEDOULX, P.
 [—] See MAUND, G.
 [Drawings, Coloured.] See TURPIN, P. J. F.
 [—] See VERBRUGGE, J. C.
 [—] See WARDE, A.
 Dreves, Friedrich, & Hayne, Friedrich Gottlob. *Botanisches Bilderbuch für die Jugend.* Vols. 1–4 (in two). Col. pls. Illus. 4to. Leipzig, 1794–1801. (C)
 Druce, George Claridge. *British plant list containing the Spermatophytes, Pteridophytes and Charophytes.* 2nd ed. [of *List of British plants*]. 8vo. Arbroath, 1928.
 Du Castel, R. A. Fréard. See FRÉARD DU CASTEL, R. A.
 Ducommun, J. C. *Taschenbuch für den schweizerischen Botaniker.* Illus. 8vo. Solothurn, 1869. (2)
 Ducq, Mrs. J. F. Illus. See LEDOULX, P. [Coloured drawings.]
 — See VERBRUGGE, J. C. [Coloured drawings.]
 Dufour, Augustine, Mlle. *L'art de peindre les fleurs à l'aquarelle, précédé d'un traité de botanique élémentaire et orné d'un choix des plus belles fleurs.* Col. pls. 4to. Paris, 1834. (C)
 Duggar, Benjamin M. *Ed. Biological effects of radiation: mechanism and measurement of radiation, applications in biology, etc.* 2 vols. Illus. 8vo. New York & London, 1936. (2)
 Dulac, Joseph. *Flore du département des Hautes-Pyrénées.* Illus. 12mo. Paris, 1867. (2)
 Dupuis, Augustin Noël Aristide. See REVEIL, P. O. *Règne végétal.*
 Duthie, A. V., Miss. *African Myxomycetes.* (Trans. Roy. Soc. S. Afr.) 8vo. Cape Town, n.d. (2)
 Earle, Mrs. C. W. *Pot-pourri from a Surrey garden. With an appendix by Lady CONSTANCE LYTTON.* 9th ed. 8vo. 1897. (C)
 Earp, Thomas Wade. *Ed. Flower and still life painting.* (Studio.) Col. pls. Illus. 8vo. 1928. (C)
 Eberhardt, Ph. *Les plantes médicinales et leurs propriétés. Planches coloriées de Mlle. S. BALLINGS.* Col. pls. Illus. 8vo. Paris, 1927. (C)

(To be continued.)

EXTRACTS FROM THE PROCEEDINGS

OF THE

ROYAL HORTICULTURAL SOCIETY.

NOTICES TO FELLOWS.

SUBSCRIPTIONS.

Fellows and Associates are reminded that anyone elected to the Society and paying his first subscription between now and the close of the year will enjoy the privileges of Fellowship for the remainder of the year 1937 and will not be required to pay a further subscription until January 1, 1939. Back numbers of the monthly parts of the Journal are generally obtainable by Fellows at 9d. a number.

FRUIT AND VEGETABLE SHOW.

The Fruit and Vegetable Show will be held in the Old Hall on October 12 and 13.

Four Challenge Cups will be competed for at this Fruit and Vegetable Show :

- (1) The George Monro Memorial Cup, which is offered for the best exhibit of Grapes shown by an amateur.
- (2) The Gordon-Lennox Cup, which is offered for the most meritorious display of fruit staged by an amateur in the competitive classes.
- (3) The Affiliated Societies' Cup for Fruits, awarded for the best exhibit of fruits staged by an Affiliated Society.
- (4) The Society's Vegetable Challenge Cup, which is offered for award to the competitor who secures the greatest number of prize points in the classes for vegetables.

The following cups are offered for award outright :

- (1) The Riddell Trophy, which is offered for award in the class for a table of Vegetables.
- (2) The Sutton Vegetable Cup, which is offered for the best exhibit of twelve distinct kinds shown by an amateur.

Full particulars in regard to these cups are given in the special schedule.

CONFERENCE ON FLOWERING TREES AND SHRUBS.

Arrangements in connexion with the Conference on Flowering Trees and Shrubs (other than Rhododendrons), which is to be held on April 26, 27 and 28, 1938, are progressing very satisfactorily, and it should be possible in the near future to announce the names of the speakers at each session of the Conference. The draft programme of the subjects for discussion is given below :

Tuesday, April 26, 1938. Afternoon Session, 3-5 P.M.

Introductory Address by the President.

Arrangement of Flowering Trees and Shrubs, including their Use on Walls, Rock Gardens, etc.

Wednesday, April 27, 1938. Morning Session, 11 A.M.-1 P.M.

Cherries, Crabs and their Allies.

Brooms and the Cistus Family.

Wednesday, April 27, 1938. Afternoon Session, 2.30-5 P.M.

Cotoneasters, Viburnums and Barberries.

Lilacs, Philadelphus, Deutzias, Weigelas, Hibiscus and Escallonias.

cliv PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

Thursday, April 28, 1938. Morning Session, 11 A.M.—1 P.M.

Propagation and Pruning.

Flowering Trees and Shrubs for various climates and soils; Preparation for Planting and Selection of Kinds.

Thursday, April 28, 1938. Afternoon Session, 2.30—5 P.M.

Other Families of Flowering Trees and Shrubs.

Magnolias and Camellias.

It is proposed that the speaker should be asked to submit a paper for publication, which would be circulated in proof form to all those attending the Conference, and, assuming that his paper had been read, each speaker would address the Conference for some 15–20 minutes, preferably illustrating his remarks with lantern slides.

Fellows who hope to attend the Conference are asked to notify the Secretary so that they may be kept informed of arrangements in connexion with the Conference and so that an estimate may be made of the number of advance copies of papers required.

As further details become available they will be published in these notices.

FLOWER ARRANGEMENT COMPETITION FOR AMATEURS.

At the Fortnightly Show on November 9 there will be a competition for one vase, bowl or other receptacle of cut flowers and/or ornamental fruits. Any natural foliage may be used, but no artificial, dyed or surface-coloured flowers, fruits or foliage, ribbon, coloured paper, or other decorative artificial material may be included in any exhibit. The material used need not have been grown by the exhibitor.

The prizes offered are as follows:

First prize a Silver Cup and third class return railway fare from the competitor's nearest station.

Second prize £1 10s. and railway fare as above.

Third prize £1 and railway fare as above.

Any prize may be withheld or modified if the exhibits are considered undeserving of the prizes offered.

The competition is open to all amateurs, whether Fellows of the Society or not, resident in Great Britain, Ireland or the Channel Islands. (No person may compete as an amateur who gains any part of his livelihood by growing vegetables, seeds, grafts, cuttings, bulbs, buds, etc., nor any employee, apprentice or pupil of a nurseryman, seedsman, florist or other horticultural trader.) The decision of the Council regarding the eligibility of an entrant shall be final.

Each exhibit must be arranged by the exhibitor in the exhibition hall without any assistance.

All entries must be made on forms obtainable from the Secretary, Royal Horticultural Society, Vincent Square, London, S.W. 1, by whom all entries must be received not later than by the first post on Wednesday, November 3.

The space allowed for each exhibit will be a part of a table 3 ft. by 3 ft. The table will be 2 ft. 6 ins. high. Each competitor's space will be separated from the adjacent spaces by partitions extending from the back to the front of the table, and rising 2 ft. 6 ins. from the top of the table. The back of each space will be open to a gangway in the same way as the front. The table top and the partitions will be covered by the Society with black casement cloth, but an exhibitor will be at liberty to superimpose draping of his own, but such draping may not extend below the table top or beyond the edges of his partitions. A specimen site will be available for inspection at the Society's Hall at the Fortnightly Show which will be held on October 26 and 27.

The positions to be occupied by all exhibits will be decided by the Society.

The size of an exhibit, both in regard to height and spread, will be at the discretion of the exhibitor, but no part of an exhibit may extend beyond the edge of the table or into another competitor's space.

Vases, bowls and other receptacles must be supplied by the exhibitor. Only one receptacle may be used.

The stems of all living plant material must be in water.

Exhibits may be staged between 2 P.M. and 10 P.M. on Monday, November 8, or between 8 A.M. and 11 A.M. on Tuesday, November 9.

Exhibits may not be labelled in any way by the exhibitor. A card with the necessary particulars will be attached to each exhibit by the Society's staff.

All competitors will be required to leave the Hall at 11 A.M. on Tuesday, November 9, at which hour judging will be commenced. Competitors will be readmitted at 12 noon.

In judging, preference will be given to exhibits which are meritorious in the choice and arrangement of the plant material and their suitability for home decoration. Regard will be had to the suitability of the receptacle, but no account will be taken of its decorative or intrinsic value. Credit will be given for originality, but rare or expensive flowers, or those which are difficult to grow, will not be regarded as more meritorious than those which are common, cheap, or easily grown.

After 11 A.M. on Tuesday, November 9, no exhibit may be touched by an exhibitor or anyone acting on his behalf, until the close of the Show, except by special permission of the Secretary.

Subject to the conditions set out above, the competition will be subject to the Society's usual rules and regulations.

CALENDAR.

October 5.—Entries for Fruit and Vegetable Show close.

October 12, 12 noon to 7.30 P.M.—Fortnightly Meeting and Show of Flowers in Season in the New Hall.

October 12, 1 to 7.30 P.M.—Fruit and Vegetable Show in the Old Hall (see p. cliii). At this Show there will be a special exhibit from Wisley on Pests and Diseases which attack Fruit and Vegetables.

At 3.30 P.M. in the Lecture Room of the New Hall, on October 12, Mr. E. A. Bunyard, F.L.S., will lecture on "The History and Cultivation of Peaches and Nectarines."

October 13, 10 A.M. to 4 P.M.—Fortnightly and Fruit and Vegetable Shows continued.

October 26, 12 noon to 7.30 P.M.—Fortnightly Meeting and Show of Orchids, Stove and Greenhouse Plants and Berried Shrubs.

At 3.30 P.M. in the Lecture Room of the New Hall, on October 26, Sir Jeremiah Colman, Bt., D.L., V.M.H., will lecture on "Orchids."

At 4.30 P.M. in the Restaurant of the Old Hall, on October 26, there will be a Lily Group Discussion on "Hybrid Lilies." See below.

October 27, 10 A.M. to 4 P.M.—Fortnightly Show continued.

November 3.—Entries for Flower Arrangement Competition close.

November 9, 12 noon to 5 P.M.—Fortnightly Meeting and Show of Flowers in Season. Flower Arrangement Competition for Amateurs. See p. cliv.

At 3.30 P.M. in the Lecture Room of the New Hall, on November 9, Mr. E. A. Bowles, F.L.S., V.M.H., Mr. E. A. Bunyard, F.L.S., and Mr. H. R. Darlington, F.L.S., will lecture on "The Gardener's Library."

November 10 and 11, 2 to 4 P.M.—A Demonstration will be given at Wisley of Planting Fruit Trees and Roses. See p. clvi.

November 23, 1 to 7.30 P.M.—British Carnation Society's Show. Fellows' tickets admit free.

November 24, 10 A.M. to 5 P.M.—British Carnation Society's Show continued.

November 30, 12 noon to 5 P.M.—Fortnightly Meeting and Show of Flowers in Season.

At 3.30 P.M. in the Lecture Room of the New Hall, on November 30, Mr. A. N. Rawes will lecture on "New Apples."

HALL LETTINGS.

From October 18 to 22 the Medical Exhibition will be held in the New Hall, and interested persons are asked to apply to the organizer, Mr. R. S. Ely, 194-200 Bishopsgate, London, E.C. 2, for particulars.

A Missions Sale of Work will be held in the Old Hall on November 3 and 4, particulars of which may be obtained from Mr. A. W. Bartlett, 6 New Square, W.C. 2.

An Exhibition of Applied Arts and Handicrafts, which Fellows will remember has on former occasions been held in the Old Hall, will be held from November 8 to 13. Particulars may be obtained from Miss Isaac, 26 Eastcastle Street, W. 1.

On November 17 and 18 Our Dumb Friends' League will hold their annual Fair in the Old Hall. Inquiries should be addressed to the Secretary, Our Dumb Friends' League, 72 Victoria Street, S.W. 1.

A Greater World Christmas Fair will be held on November 27 in the Old Hall, particulars of which may be obtained from Miss W. Moyes, 3 Lansdowne Road, W. 11.

LILY GROUP.

The Lily Group consists of Fellows and Associates of the Royal Horticultural Society who are especially interested in Lilies, *Nomocharis* and *Fritillaries*. Its object is to provide members with facilities for meeting to exchange views upon

CLVI PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

these plants. Those who wish to join should apply in writing to the Secretary, who notifies members by post of all meetings.

The last meeting of the year will take place on October 26, in the Restaurant of the Old Hall, when there will be a discussion on "Hybrid Lilies." All Fellows are cordially invited to take part in the discussion and to bring plants, cut blooms, photographs or lantern slides bearing upon the subject. Inquiries from beginners are always welcomed.

PRACTICAL DEMONSTRATION AT WISLEY.

A demonstration on Planting Fruit Trees and Roses will be given at Wisley on November 10 and 11 from 2 P.M. to 4 P.M., weather permitting. Fellows who intend to be present at this demonstration are asked to inform the Director, R.H.S. Gardens, Wisley, Ripley, Surrey, beforehand, mentioning on which day they will attend, in order that adequate arrangements may be made.

HORTICULTURAL COLOUR CHART.

Owing to the vast amount of work involved in the compilation of the Horticultural Colour Chart it has not been possible to publish it as soon as had been anticipated. The work on the Chart is, however, progressing, and the first volume will appear at the earliest possible moment.

Anyone desiring further particulars about this Chart is asked to write to the Secretary. Applications for the first volume at the price of 10s. a copy, exclusive of postage, will be accepted up to the date of publication. After publication copies will only be available at that price until the Society's limited stock is exhausted, when the price will be £1 1s. a copy.

PICTURES, PLANS, PHOTOGRAPHS, ETC.

With the approach of winter, space will be available at Fortnightly Shows for pictures and photographs of plants, flowers and gardens, and for plans or models of gardens. Regulations with regard to these exhibits may be had on application to the Secretary. The dates of the Shows when these exhibits are permitted are November 9, 30, December 14, 1937, January 11, 25, February 8 and 22, 1938.

HORTICULTURAL SUNDRIES.

The exhibition of Horticultural Sundries will be allowed at the Fortnightly Shows on December 14, 1937, and January 11 and 25, 1938. If space is available, sundries will also be admitted on November 30.

THE JONES-BATEMAN CUP FOR RESEARCH IN FRUIT-GROWING.

In 1920 Miss L. Jones-Bateman, of Cae Glas, Abergelle, presented to the Royal Horticultural Society a valuable silver-gilt replica of the Warwick Vase to be used for the encouragement of fruit production. It was decided to offer it triennially for researches in the growing of Hardy Fruits, Figs, Grapes and Peaches in the open or under glass, and it is available for award in the present year.

Candidates should submit accounts of their work by October 30. The work dealt with must have been carried out by the candidate in the United Kingdom mainly during the past five years. The Cup will be held for three years by the successful candidate who must give a bond for its safe return, and when the Cup is relinquished the holder will receive a commemorative gold medal. The holder will be eligible to compete on the next or any succeeding occasion.

The Assessors will be three, two appointed by the Royal Horticultural Society and one by the National Farmers' Union, and they will report to the Council of the Royal Horticultural Society upon the originality and comparative potential value to the fruit-growing industry of the work of the candidates.

The Council of the Royal Horticultural Society will award or withhold the Cup at its discretion.

INSPECTION OF GARDENS.

Many Fellows may not be aware of the terms under which their gardens can be inspected by the Society's Garden Inspector, and advice given thereon. They are set out below, and it will be seen that special arrangements can be made when Fellows living in the same district co-operate.

"The inspection of Gardens belonging to Fellows is conducted by a thoroughly competent Inspector from the Society who reports and advises at the following cost, viz. : a fee of about £3 3s. for one day, or £5 5s. for two

consecutive days, together with all out-of-pocket expenses. No inspection may occupy more than two days, save by special arrangement. Should two or more Fellows residing in the same district, with their gardens within easy reach of one another, desire to have the services of the Garden Inspector, arrangements will be made for such a combined inspection and the fee and expenses divided by consent of those concerned. Fellows wishing for the services of an Inspector are requested to give at least a week's notice and choice of two or three days, and to indicate the most convenient railway station and its distance from their Garden. Gardens can only be inspected at the *written* request of the owner."

FRUIT FOR NAMING.

At this time of the year there is always a large amount of fruit sent to the Committee for naming, and Fellows are reminded of the following instructions which, if adhered to, will materially assist the Committee in their task of identification, and thus save Fellows from being disappointed owing to the Committee being unable to identify the fruit from the samples sent.

"Send at least three perfect specimens of a variety. Do not send until the fruits are mature, and then choose specimens representative of the particular variety. Avoid sending bruised, diseased or abnormal fruits. Include with each variety a typical shoot with foliage. Number each variety, preferably in Roman figures, by marking the skin with a hard pencil, and keep a record of the tree from which it is gathered. Labels are often displaced during transit. Wrap each fruit in paper and pack it carefully and securely in wood-wool or similar material. Flimsy cardboard boxes are usually crushed in the post, while scented-soap boxes taint the fruit and obscure the characteristic flavour. Give all the information you can respecting the age of the trees and how they are grown, *e.g.* indoors or out, as cordons, bushes, or standards, etc."

It is a convenience if specimens are sent so as to reach the office by the first post on the Monday preceding a Fortnightly Show.

UNATTENDED EXHIBITS.

Attention is called to the rules for unattended exhibits. The Society's officers will, if necessary, unpack and stage small exhibits if the Secretary has been notified beforehand of their coming, and if the owner is unable to accompany them, but in no case can the Society undertake or be responsible for their repacking and return.

NEW PUBLICATION.

The Royal Horticultural Society's Daffodil Year-Book for 1937 (Number 8 in the series) has just appeared. It contains articles on Daffodils and Daffodil growing at home and abroad, by, among others, Messrs. F. A. Secrett, G. L. Wilson, E. A. Bowles, Rev. T. Buncombe, Lady Moore, Dr. Sibyl Horner, Messrs. A. W. White, W. Jackson, F. J. Chittenden, Miss Hinchliff, Messrs. P. H. Gregory, L. N. Staniland, C. S. Radcliff and D. Tannock, Reports of Shows in England and the Dominions, and many interesting notes. 154 pp. and 21 illustrations. 5s. paper, 6s. cloth. Post free from the R.H.S. Offices, Vincent Square, London, S.W. 1.

WISLEY IN OCTOBER.

The last of the hardy plant trials for the season are the Michaelmas Daisies and Dahlias; if the latter have not by this time succumbed to frosts they should still be making a bright display.

In the neighbouring fruit store is exhibited a representative selection of Apples and Pears from the Trials and orchards, as they become available.

On the Rock Garden the Gentians which flower late in the year, such as *G. Veitchiorum* and *G. sino-ornata*, provide patches of colour, and wide borders of the last mentioned will also be seen in the Azalea Garden. The Japanese Maples at the top of the Alpine meadow form a brilliant picture in their scarlet and crimson against a background of Rhododendron foliage. The first Snowdrop, *Galanthus Oligas*, appears here this month, and species of Crocus will be found in the beds near the Alpine house and elsewhere.

In the Wild Garden and Seven Acres the bright autumn tints of trees and shrubs, together with their variously coloured and arranged fruits, make the chief display in the Gardens at this season. In the woodland *Vacciniums*, *Disanthus*, *Azaleas* and *Enkianthus* are the most conspicuous, with the two

North American trees *Oxydendrum* and *Liquidambar* and such smaller plants as *Gaultherias* and *Pernettya*, notable for their coloured berries. In Seven Acres Barberries and *Cotoneasters*, *Pyracanthas* and Crab-Apples, *Euonymus* and *Stranvaesias* all bear their berries too, usually in shades of red, sometimes yellow or black. The scarlet Oak, *Quercus coccinea*, at the eastern end is a notable feature whose leaves persist for many weeks after those of other trees have been blown away. Shrubs with coloured stems are the Dogwoods (species of *Cornus*), Willows, *Stephanandra*, and some of the Barberries such as *Berberis Jamesiana* and *B. yunnanensis*. Along the river bank in Howard's Field the species of *Rosa* provide a great assortment of highly ornamental hips, and should be inspected by those who seek variety in their fruiting shrubs.

Within the shelter of the glasshouses are a greater number of plants in bloom. *Nerines* and *Pelargoniums* will scarcely have finished their season, while in the large Temperate House the bell-shaped crimson flowers of *Abutilon insigne* hang above the head, and the first flowers of *Acacia retinodes*, the attractive bright red *Epacris ardentissima* and royal purple *Tibouchina semidecandra* are visible.

The Half-hardy house invariably has some items of interest, and on the walls of the Laboratory *Abutilon megapotaemicum*, the pink-flowered *Abelia grandiflora* and *A. Schumannii*, and possibly the scarlet Pomegranate, may continue in bloom if the weather be not too inclement. Near the entrance gates is a clump of the clear golden yellow *Sternbergia*, often taken for a *Crocus* but in no way related to them.

GENERAL MEETINGS.

AUGUST 4, 1937.

SCIENTIFIC COMMITTEE.—Mr. E. A. BOWLES, M.A., F.L.S., F.R.E.S., V.M.H., in the Chair, and five other members present.

Lilium Sargentiae.—Mr. Grove showed a flower of this Lily to draw attention to the pink feathering on the margins of the inner segments, a character which he had not before observed.

Fruits for identification.—A fruit gathered in Brazil was sent for identification and proved to be *Stiffia chrysantha*.

Plants for identification taken by Mr. Cotton at the last meeting were found to be *Aconitum palmatum* shown by Mr. Kisch (K.W. 12318), a new species of *Amorphophallus* from Siam shown by Mr. Bowles, and *Campanula longestyla* shown by Mr. Ladhams. This name has at times been conferred on *C. sibirica*.

FRUIT AND VEGETABLE COMMITTEE.—Mr. E. A. BUNYARD, F.L.S., in the Chair, and six other members present.

Exhibits.

R.H.S. Commercial Fruit Trials, Wisley: Plums 'Stint,' 'Black Prince,' 'Utility.'

FLORAL COMMITTEE A.—Mr. D. INGAMELLS in the Chair, and ten other members present.

Awards Recommended :—*Silver Flora Medal.*

To Messrs. Kelway, Langport, for Gladioli.

Silver Banksian Medal.

To Messrs. Engelmann, Saffron Walden, for Carnations.

To Mr. E. Ladhams, Elstead, for herbaceous plants.

To Mr. E. B. Le Grice, North Walsham, for Roses.

To Mr. A. Miles, Bickley, for herbaceous plants.

To Messrs. Prichard, Christchurch, for herbaceous plants.

Flora Medal.

To Messrs. Bental, Havering, for Roses.

To Mr. H. A. Brown, S. Chingford, for Fuchsias.

To Hocker Edge Gardens, Cranbrook, for Gladioli, Lilies, etc.

To Mr. A. Perry, Enfield, for herbaceous plants.

To Messrs. Wakeley, London, for Gladioli.

Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations and *Dianthus Allwoodii*.

To Mr. W. E. B. Archer & Daughter, Sellindge, for Roses.

To Messrs. B. R. Cant, Colchester, for Roses.

To Messrs. Carlile, Twyford, for Delphiniums, etc.

To Messrs. Letts, Hadleigh, for Roses.

To Messrs. Simmons, Finchley, for Violas.

To Mr. H. Woolman, Birmingham, for Begonias.

Award of Merit.

To Rose 'Dainty Maid' (votes unanimous), from Mr. E. B. Le Grice, North Walsham. See p. 454.

Selected for trial at Wisley.

Dianthus 'Sweet Wivelsfield Double Flowered,' from Messrs. Allwood.

Dianthus 'Sweet Wivelsfield Giant Flowered' from Messrs. Allwood.

Gladiolus 'Anna May Wong,' from Messrs. Wakeley, London.

Gladiolus 'Anthony Eden,' from Messrs. Wakeley, London.

Gladiolus 'Capt. Abel Smith,' from Messrs. Kelway, Langport.

Gladiolus 'Royal Gold,' from Messrs. Wakeley, London.

Godetia 'Histon Glory,' from Messrs. Unwin, Histon.

Other Exhibits.

Major G. Churcher, Lindfield: *Gladiolus* 'Royal Pledge.'

Messrs. Clark, Dover: Scabious.

Misses Hopkins, Coulsdon: herbaceous plants.

cix PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

Mr. E. Ladhams, Elstead : *Chrysanthemum maximum* 'Aigrette.'

Messrs. Prichard, Christchurch : *Veronica incana rosea*.

Mr. H. Woolman, Birmingham : Begonias 'Mrs. J. Layton' and 'Rose Edney.'

FLORAL COMMITTEE B.—Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and ten other members present.

Award Recommended:—

Award of Merit.

To *Verbena bonariensis* as a hardy flowering plant (votes 6 for), from C. H. Curtis, Esq., Brentford. See p. 415.

Selected for Trial at Wisley.

The following varieties of *Clematis Viticella*, exhibited by Mr. E. Markham, Gravetye, East Grinstead, were selected for trial at Wisley: 'Grey Lady,' 'Stolen Kiss,' 'Stella,' 'Moat Star.'

Other Exhibits.

Mr. A. Corderoy, Eltham : rock garden plants.

Collingwood Ingram, Esq., Benenden : *Carlina acanthifolia*.

Mrs. E. Kerrison, Norwich : *Eucalyptus ficifolia*.

Mr. R. Colpoys Wood, West Drayton : flowering shrubs.

ORCHID COMMITTEE.—E. KENNETH WILSON, Esq., in the Chair, and five other members present.

Award Recommended:—

Cultural Commendation.

To R. T. Salmon, Esq., Woodslee, Hounsden Road, Winchmore Hill, for *Odontoglossum* × 'Thecla' ('Aglao' × 'Penelope'), with two spikes and a total of sixty flowers.

Other Exhibit.

W. T. Higgins, Esq., Croydon : Orchid species.

JOINT DAHLIA COMMITTEE.—Mr. T. HAY, V.M.H., M.V.O., in the Chair, and six other members present.

Selected for trial at Wisley.

From Messrs. Stredwick, St. Leonards-on-Sea : Dahlia 'Heather' (Dec.), 'Hugh Redwood' (Dec.), 'Margaret' (Dec.).

From Mr. J. T. West, Brentwood : Dahlia 'Brentwood Bedder.'

Dahlias were also submitted by Mr. O. Parratt, Farnham.

AUGUST 17, 1937.

FORMARKE CUP COMPETITION.

The Formarke Cup, for twenty spikes of named Gladioli in not less than ten varieties, was awarded to Messrs. Kelway & Son, Ltd., Langport.

A lecture was given by Mr. D. E. Green, M Sc, on "Control of Antirrhinum Rust."

Chairman, Mr. L. N. Sutton.

SCIENTIFIC COMMITTEE.—Mr. E. A. BOWLES, M.A., F.L.S., F.R.E.S., V.M.H., in the Chair, and five other members present.

Pupa in Crocus corm.—Mr. Wilson reported that the pupa found in a Crocus corm by Mr. Trotter was that of the hover fly, *Syrphia pipiens*. The larvae of this species feed on decaying vegetable matter.

Accelerated rooting of cuttings.—Dr. Tincker showed pieces of the inflorescence of *Anthemis Sancti-Johannis* which after treatment with alpha naphthalene acetic acid for 24 hours, rooted well in 8 days, much in advance of the untreated pieces.

Beetle injurious to Lilies.—Mr. G. F. Wilson showed a specimen of a beetle related to the Asparagus beetle, viz. *Crioceris lili*, which had proved very injurious to Lilies in Germany but which has hitherto not found its way to this country.

He also showed a longicorn beetle which had been found in raffia, a tropical species, *Niphonia hookeri*.

Fasciated plants.—Mr. D. B. Crane showed a fasciated specimen of the inflorescence of *Sempervivum spinifolium*. A fasciated stem of the common spear thistle 4½ inches wide collected in Suffolk was also shown.

Branching Oat.—Mr. Cotton reported that the grass of which Dr. Voelcker had shown an illustration was undoubtedly the oat. Several specimens branching above the base had been discovered in a field, and it may not be uncommon.

Virescent Helenium.—Mr. J. W. Barr showed a specimen of the well-known virenscent Helenium.

FRUIT AND VEGETABLE COMMITTEE.—Mr. E. A. BUNYARD in the Chair, and thirteen other members present.

Awards Recommended :—

Award of Merit.

To *Rubus nitidioides* as a dessert Blackberry for private gardens (votes unanimous), from The Director, John Innes Horticultural Institution, Merton, S.W. 19.

Selected for trial at Wisley.

Melon 'Coronation' from Mr. N. S. Holland, Saxbys, Cowden, Kent.

Other Exhibits.

Mr. A. J. Aplin, Godmersham Park, Canterbury, Kent: seedling Apple.

Mr. R. A. Foster-Melliard, Bude: Apple 'John Short.'

Mr. Henry Evans, "Lonlas," Quarry Road, Pwllgwaun, Pontypridd, S. Wales: Raspberry seedling.

Mr. E. A. Bunyard, Maidstone: Apple 'Cardinal.'

R.H.S. Commercial Fruit Trials, Wisley: Plums 'Sugar' and 'Brandy Gage.' Apple Seedling ¹/₂ Laxton.

FLORAL COMMITTEE A.—Mr. G. W. LEAK, V.M.H., in the Chair, and ten other members present.

Awards Recommended :—

Gold Medal.

To Messrs. Konynenburg & Mark, Noordwyk, Holland, for Gladioli.

Silver-gilt Flora Medal.

To Messrs. Bath, Wisbech, for Gladioli.

Silver-gilt Banksian Medal.

To Messrs. Unwin, Histon, for Gladioli.

Silver Flora Medal.

To Messrs. Blackmore & Langdon, Bath, for Delphiniums and Phlox.

To Mr. E. Ladhams, Elstead, for herbaceous plants.

To Messrs. Wakeley, London, for Gladioli.

Silver Banksian Medal.

To Messrs. Brown & Such, Maidenhead, for Dahlias.

To Messrs. Cheal, Crawley, for Dahlias.

To Messrs. Engelmann, Saffron Walden, for Carnations.

To Hocker Edge Gardens, Cranbrook, for Gladioli and Lilies.

To Messrs. Stewart, Ferndown, for Gladioli and Montbretias.

Flora Medal.

To Messrs. Allwood, Haywards Heath, for Carnations and Dianthus.

To Mr. A. Miles, Bickley, for herbaceous plants.

To Messrs. Prichard, Christchurch, for herbaceous plants.

Banksian Medal.

To Mr. W. E. B. Archer & Daughter, Sellindge, for Roses.

To Messrs. Bental, Havering, for Roses.

To Messrs. B. R. Cant, Colchester, for Roses.

To Messrs. Carlile, Twyford, for herbaceous plants.

To Mr. J. F. Cumming, Wisbech, for Scabious, Pyrethrums, etc.

To Mr. E. B. Le Grice, North Walsham, for Roses.

To Mr. A. Perry, Enfield, for Kniphofias, Catananches, etc.

To Captain B. Symons-Jeune, Old Windsor, for Dahlias.

Award of Merit.

To *Begonia* 'Bella' as a greenhouse pot plant (votes 8 for, 2 against), from Messrs. Blackmore & Langdon, Bath. See p. 454.

To *Begonia* 'John Langdon' as a greenhouse pot plant (votes unanimous), from Messrs. Blackmore & Langdon. See p. 454.

To *Begonia* 'N. M. Agnew' as a greenhouse pot plant (votes 7 for), from Messrs. Blackmore & Langdon. See p. 454.

To *Thalictrum dipterocarpum* 'Hewitt's Double,' as a hardy herbaceous plant (votes unanimous), from Messrs. Hewitt, Stratford-on-Avon. See p. 455.

clxii PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

Selected for trial at Wisley.

Kniphofia 'Leviathan' from Messrs. Prichard, Christchurch.

Other Exhibits.

Messrs. Allwood, Haywards Heath : *Dianthus* 'Delight.'

Messrs. Hewitt, Stratford-on-Avon : Dahlias.

Misses Hopkins, Coulsdon : herbaceous plants.

Mr. A. Miles, Bickley : *Helenium* 'Baronin London.'

Messrs. Wheatcroft, Nottingham : Roses.

FLORAL COMMITTEE B.—Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and nineteen other members present.

Awards Recommended :—

Gold Medal.

To Mr. Robert Bolton, Birdbrook, Essex, for a collection of hardy ferns.

Flora Medal.

To Messrs. Russell, Richmond, for Nymphaeas with Clematis and other shrubs.

Banksian Medal.

To Mr. J. Klinkert, Richmond, for clipped Box trees.

Award of Merit.

To *Ornithogalum arabicum* as a flowering plant for the cool greenhouse (votes unanimous), from Viscountess Byng of Vimy, Thorpe-le-Soken. See p. 454.

To *Lilium* × 'T. A. Havemeyer' as a hardy flowering plant (votes 11 for), from Messrs. R. Wallace, Tunbridge Wells. See p. 454.

Cultural Commendation.

To Mr. Brand, gardener to Viscountess Byng of Vimy, Thorpe-le-Soken, for a pan of *Ornithogalum thyrsoides*.

Other Exhibits.

T. T. Barnard, Esq., Wareham : seedlings of *Watsonia Galpinii*.

Mr. A. Corderoy, Eltham : rock garden plants.

Maj.-Gen. F. R. Marshall, C.B., Inverness : *Lilium Henryi*.

The Lady Rayleigh, Chelmsford : *Eucalyptus coccifera* seedling, *Cassinia leptophylla*.

H. J. Talbot, Esq., Uxbridge : *Hedychium Gardnerianum*.

ORCHID COMMITTEE.—Mr. E. KENNETH WILSON in the Chair, and six other members present.

Plant for Identification :—

Mrs. T. G. Scott, Pelsham, Peasmarsh, Sussex, sent for identification a plant of *Schomburgkia Thomsoniana* collected in Grand Cayman, West Indies.

Other Exhibit.

N. Prinsep, Esq., The Boxes, Pevensey Bay : *Lasiodactylea* × 'Adonis' var. *grandiflora*.

JOINT PERPETUAL FLOWERING CARNATION COMMITTEE.—Mr. D. INGAMELLS in the Chair, and six other members present.

Exhibit.

Grant Singer, Esq., Norman Court, West Tythealey, Salisbury : Perpetual Carnation 'Grant Singer' (to be seen again).

JOINT DAHLIA COMMITTEE.—Mr. T. HAY, V.M.H., M.V.O., in the Chair, and eight other members present.

Selected for trial at Wisley.

Dahlias 'Cinnamon Gem,' 'Towneley Cerise,' 'Towneley Welcome,' from Mr. J. F. Barwise, Burnley.

'Tropic Star' (Semi-Cactus), from Messrs. Hewitt, Stratford-on-Avon.

'Falma' (Small Dec.), 'Fanciful' (Dec.), 'Golden Rays' (Cactus), 'Miss Florence Smith' (Cactus), 'Quicksilver' (Cactus), 'Rev. Frank Boynton' (Dec.), 'Thistledown' (Cactus), from Messrs. Stredwick, St. Leonards-on-Sea.

'Crimson Glorious,' from Mr. J. T. West, Brentwood.

Dahlias were also submitted by A. T. Barnes, Esq., Bedford ; A. J. Dixon, Esq., Worthing ; Lt.-Col. F. H. Lister, D.S.O., Blandford ; P. M. Randall, Esq., Lyndhurst ; J. S. Wallis, Esq., Histon.

BOOKS ADDED TO THE LIBRARY, 1936.

(Continued from p. clii)

- Eberlein, Harold Donaldson. Villas of Florence and Tuscany. Col. pl. Illus. 8vo. Philadelphia, etc., 1922. (C)
- Eberstaller, Robert. Beiträge zur vergleichenden Anatomie der Narcisseae. (Denkschr. Akad. Wiss. math.-nat. Wien, xcii.) Illus. 4to. [Vienna], 1915. (2)
- École, L', du jardinier fleuriste. See [FRÉARD DU CASTEL, R. A.].
- Ecological Society of America. Naturalists' guide to the Americas. See SHILFORD, V. E. Ed.
- Edwards, George. Ed. See CATESBY, M. Natural history of Carolina. 2nd ed.
- Ehret, Georg Dionys. Illus. [Original paintings of plants.] Col. pls. fol. n.p., (1764-67]. (C)
- Illus. See [DRAWINGS, COLOURED, . . . on vellum].
- Illus. See TREW, C. J. Uitgezochte planten.
- Elisha, George. Transl. See FORSTER, C. F. [Handbook of Cactus culture.]
- Ellacombe, Henry Nicholson. [Manuscript catalogue of hardy plants grown at Bitton vicarage.] 8vo. [Bitton. c. 1901-14.] (2)
- Elliott, Clarence. Rock garden plants. Col. pl. Illus. 8vo. (1935.) (3)
- Gardening in sinks and pig troughs. Illus. 8vo. Stevenage, 1936. (3)
- Elphinstone, Roderick. Ed. See BURNETT, G. T. The cyclopaedia of useful . . . plants.
- Endlicher, Stephan Ladislaus. Paradisus Vindobonensis. See HARTINGER, A.
- Ernle, Lord. See PROTHERO, R. E.
- Ernst, Alfred. Bastardierung als Ursache der Apogamie im Pflanzenreich. Illus. 8vo. Jena, 1918. (2)
- Essig, E. O. A check list of Fuchsias. 8vo. Berkeley, Calif., 1936. (3)
- Faber, Friedrich Carl von. Ed. See SCHIMPER, A. F. W. Pflanzengeographie. 3rd ed.
- Farleigh, John. Illus. See ARMITAGE, F. A country garden.
- Farwell, Oliver Atkins. Notes on the Michigan species of *Polygonatum*. (Bull. Torrey Bot. Club, xlii.) Illus. 8vo. New York, 1915. (2)
- Fenner, C. A. Beiträge zur Kenntnis der Anatomie, Entwicklungsgeschichte und Biologie der Laubblätter und Drüsen einiger Insektivoren. (Flora, xciv.) Illus. 8vo. Munich, 1904. (2)
- Ferree, Barr. American estates and gardens. Illus. 8vo. New York, 1904. (C)
- Fischer, Ed., of Berne. Ed. See FISCHER, L. Flora von Bern.
- Fischer, Johann Baptist. See BLUME, C. L. Flora Javae.
- Fischer, Ludwig. Flora von Bern. 8th ed. Herausg. von ED. FISCHER. Map. 8vo. Berne, 1911. (7)
- Flahault, Charles. Introduction. See ALBERT, A. Catalogue . . . du Var.
- ["Flora du Desert": coloured drawings of flowers thus named.] 2 vols. Col. pls. 8vo. n.p., n.d. (C)
- Forbes, Francis Blackwell, & Hemsley, William Botting. An enumeration of all the plants known from China proper, Hainan, Corea, the Luchu Archipelago and the Island of Hongkong, together with their distribution and synonymy. (Journ. Linn. Soc. Bot., xxiii, xxvi, xxxvi.) 3 vols. Illus. 8vo. 1886-1905. (C)

- Formánek, Eduard.** See VANDAS, K. *Reliquiae Formanekianae.*
- Förster, Carl Friedrich.** [Handbook of Cactus culture, 2nd ed. edited by THEODOR RÜMLER, translated from the German by GEO. ELISHA in 1895.] 2 vols. 8vo. (*Unpublished MS.*) (C)
- Forward, Charles W.** The fruit of the tree: an argument on behalf of man's primitive and natural diet. 8vo. [192-.] (C)
- Foster-Melliar, A.** The book of the rose. 2nd ed. Illus. 8vo. 1902. (C)
- Fourcade, H. G.** Contributions to the flora of the Knysna and neighbouring divisions. (Trans. Roy. Soc. S. Afr., xxi.) 8vo. Cape Town, 1932. (2)
- Fraas, Carl Nicol.** Synopsis plantarum florae classicae. 2nd ed. 8vo. Berlin, 1870. (2)
- France, R. H., & others.** Das Leben der Pflanze. 8 vols. Col. pls. Illus. 8vo. Stuttgart, 1905-13. (2)
- Francis, Mary Evans.** The book of grasses; an illustrated guide to the common grasses, and the most common of the rushes and sedges. Col. pls. Illus. 8vo. New York, 1920. (C)
- [Fréard du Castel, Raoul Adrien.]** L'école du jardinier fleuriste. Nouvelle éd. corrigée par un membre de la Société Oeconomique de Berne. 12mo. Yverdon, 1767. (2)
- 12mo. Amsterdam & Paris, 1779. (2)
- Fries, Thore Christian Elias.** Die *Anagallis*-Arten der afrikanischen Hochgebirge. (Notizbl. Bot. Gart. Berlin-Dahlem, viii.) Illus. 8vo. [Berlin], 1923. (2)
- See ALM, C. G. Monographie der Gattung *Blaeria*.
- Fritsch, Karl, the younger.** *Saponaria Wiemanni* hybr. nov. (*caespitosa* × *lutea*). (Oest. Bot. Zeitsch.) 8vo. [Vienna], 1897. (2)
- Ueber einige hybride Caryophyllaceen. (Oest. Bot. Zeitsch.) 8vo. [Vienna], 1898. (2)
- *Erythronium Dens Canis* L. in Nieder-Österreich. (Oest. Bot. Zeitsch.) 8vo. [Vienna], 1904. (2)
- *Ed. Schedae ad floram exsiccatam Austro-Hungaricam.* See VIENNA. UNIVERSITÄT.
- Fuchs, Leonhart.** [Herbal.] See SPRAGUE, T. A., & NELMES, E.
- Gager, Charles Stuart.** Tuber-formation in *Solanum tuberosum* in daylight. (Torreya, vi.) Illus. 8vo. [New York], 1906. (2)
- Gagnepain, François.** Zingibéracées nouvelles de l'herbier du Museum [d'Histoire Naturelle], 3-21. (Bull. Soc. Bot. France, xlv-lv.) 8vo. Paris, 1902-08. (8)
- Gamble, James Sykes, & Fischer, Cecil Ernest Claude.** Flora of the Presidency of Madras. 3 vols. Map. 8vo. 1915-36. (9)
- Garden, The** [Coloured plates from]. 2 vols. 4to. n.p., n.d. (C)
- Gardener, Ion.** The feate of gardeninge. See AMHERST, A. M. T. A fifteenth century treatise on gardening.
- Garner, H. V., & others.** Profit from fertilizers. By H. V. GARNER, A. H. HOARE, H. C. LONG, R. G. STAPLEDON, F. RAYNS, T. WALLACE. Foreword by Viscount Bledisloe. Illus. 8vo. 1936. (1)
- Gatin, C. L.** Les fleurs des bois. Col. pls. Illus. 8vo. Paris, 1913. (C)
- [Geel, B. C. van. Ed.]** Sertum botanicum, collection de plantes remarquables par leur utilité, leur élégance, etc. 6 vols. Col. pls. Illus. fol. Brussels, 1828-32 [-1836]. (C)
- Geikie, Sir Archibald.** The love of nature among the Romans. 8vo. 1912. (2)
- [Gentil, François, &] Liger, Louis.** The retir'd gard'ner. The 1st vol. being a translation of *Le jardinier solitaire, etc.* Rev. by GEORGE LONDON & HENRY WISE. Illus. 8vo. 1706. (2)
- Gérard, Frédéric.** See REVEIL, P. O. Règne végétal.
- Gesner, Conrad.** Opera botanica . . . ex bibliotheca CHRISTOPHORI JACOBI TREW . . . nunc primum in lucem edidit et prefatus est CASIMIRUS CHRISTOPHORUS SCHMIEDEL. 2 parts (in one). Col. pls. Illus. fol. Nürnberg, 1751-71. (C)

- Gilg, Ernst. Ueber die Blütenverhältnisse der Gentianaceengattungen *Hochinia* Gardn. und *Halenia* Borchh. (Ber. Deutsch. Bot. Ges., xiii.) Illus. 8vo. Berlin, 1895. (2)
- Giraude, Jane E. The floral months of England. Col. pls. fol. [c. 1840-61]. (C)
- Glück, Hugo. Pteridophyten und Phanerogamen. See PASCHER, A. Die Süßwasser-flora Mitteleuropas.
- Gomez de Ortega, Casimiro. Continuacion. See QUER Y MARTINEZ, J. Flora española. Vols. 5-6.
- Good, Ronald. On the distribution of the lizard orchid (*Himantoglossum hircinum* Koch). (New Phytol., xxxv.) Map. 8vo. Cambridge, 1936. (3)
- Goodchild, John George. Soils of Cumberland. See HODGSON, W. Flora of Cumberland.
- Goosens, A. Illus. See HAARLEM. ALGEMEENE VEREENIGING VOOR BLOEMBOLLENCULTUR. Hardy bulbous plants.
- Grainger, John. Garden science. Illus. 8vo. [1935.] (1)
- Gravely, Frederick Henry, & Mayuranathan, P. V. The Indian species of the genus *Caralluma* (fam. Asclepiadaceae). (Bull. Madras Gov. Mus., Nat. Hist., iv.) Illus. 8vo. Madras, 1931. (2)
- Graves, George. See CURTIS, WM., & OTHERS. Flora Londinensis. 2nd ed.
- Graveson, William. Alpine plants at home. See WRIGHT, W. P. Alpine flowers.
- Grimston, Edward. Transl. See ACOSTA, J. DE. Natural . . . history of the Indies.
- Groen, J. van der. Le jardinier hollandais . . . Der niederländische Gärtner. Illus. 4to. Amsterdam, 1669. (C)
- Gromort, Georges. Jardins d'Italie . . . donnant plus de 170 vues des villas de la Campagne romaine, de la Toscane et de la Haute-Italie. 2 vols. Illus. fol. Paris, 1922. (C)
- Grüning, Ursula. Beiträge zur sachgemässen Behandlung von Schnittblumen. 8vo. Hamburg, 1935. (2)
- Guillemain, Antoine. Table alphabétique. See REDOUTÉ, P. J. Choix des plus belles fleurs.
- Gulyás, Antal. *Syringa Josikaea* Jacqu. Fil., und *Syringa emodi* Wallich. (Muz. Füzet. Kolosvar, ii.) Illus. 8vo. Kolosvar, 1909. (2)
- Haarlem. Algemeene Vereeniging voor Bloembollencultuur. Hardy bulbous plants. Florilegium Harlemense. The plates from nature by A. GOSENS. Edited by EDWARD STEP. Col. pls. 4to. 1908. (C)
- Hacquet, Balthazar. Plantae alpinae Carniolicae. Illus. 4to. Vienna, 1782. (C)
- Hadfield, Miles. Ed. The gardener's companion. Col. pl. Illus. 8vo. (1936.) (1)
- Haeckel, Ingeborg. Über Iridaceen. (Flora, cxxv.) Illus. 8vo. Jena, 1930. (2)
- Hafiz, S. Abdul-. See ABDUL-HAFIZ, S.
- Hall, Sir Alfred Daniel. Foreword. See TAYLOR, H. V. The apples of England.
- Ed. See PROTHERO, R. E. English farming. 5th ed.
- Hancock, Ralph. When I make a garden. Illus. 8vo. [1936.] (3)
- Hannon, Joseph Desiré. Flore belge. 3 vols. (in one). Illus. Brussels, [1847]. (2)
- Hansell, Dorothy Ebel. Preface. See MATSCHAT, C. H. Mexican plants.
- Harper, Roland McMillan. Catalogue of the trees, shrubs and vines of Alabama, with their economic properties and local distribution. (Geol. Surv. Alabama, Monog., 9.) Illus. 8vo. University, Alabama, 1928.
- Hartinger, Anton, & Seemann, Berthold. ENDLICHER's Paradisus Vindobonensis. Abbildungen seltener und schönblühender Pflanzen . . . von A. HARTINGER, erläutert von B. SEEMANN. Vol. 1. Col. pls. fol. [1844-] 1860. (C)

- Hasskari, Justus Carl.** Commelinaceae Indicae, imprimis Archipelagi Indici, adjectis nonnullis hisce terris alienis. 8vo. Vienna, 1870. (8)
- Hausknecht, Carl.** Eine neue *Scilla* [*S. persica*] Persiens. (Mitth. Thür. Bot. Ver., N.S., x.) 8vo. [Weimar], 1897. (2)
- Hay, Robert Edwin.** See HOLMES, T. C. Gardener's handbook.
- Hayne, Friedrich Gottlob.** See DREVES, F. Botanisches Bilderbuch. Vols. 2-4.
- Hemsley, William Botting.** See FORBES, F. B. An enumeration of all the plants known from China.
- Hennedy, Roger.** The Clydesdale flora. Appendix by R. H. PATERSON. Biographical sketch by WILLIAM SIMPSON. In memoriam [4th] ed. Illus. 8vo. Glasgow, 1878. (2)
- Appendix by R. H. PATERSON, and an additional appendix by THOMAS KING. 5th ed. Illus. 8vo. Glasgow, 1891. (2)
- Herb Society of America.** The herbarist, 1935: 1936. 8vo. Boston, Mass., 1935-36. (10)
- Herbarist, The.** See HERB SOCIETY OF AMERICA.
- Hérinier, François.** See REVEIL, P. O. Règne végétal.
- Hervier, Joseph.** Excursions botaniques de M. ÉLISÉE REVERCHON dans le massif de La Sagra et à Velez-Rubio (Espagne) de 1899 à 1903. (Bull. Acad. Géogr. Bot.) Illus. 8vo. Le Mans, 1905. (2)
- Excursions botaniques de M. ÉLISÉE REVERCHON dans le massif de La Sagra (Espagne) de 1904 à 1905. (Bull. Acad. Géogr. Bot.) 8vo. Le Mans, 1907. (2)
- Hetley, G. B. (Mrs. Charles Hetley), & Raoul, Édouard.** Fleurs sauvages et bois précieux de la Nouvelle-Zélande. Col. pls. 4to. Paris & London, 1889. (C)
- [**Hey, Mrs. William.**] The moral of flowers. Col. pls. 8vo. 1833. (C)
- Hill, Sir Arthur William.** Ed. See NASH, J. Poisonous plants.
- Hill, John.** The vegetable system, or the internal structure and the life of plants . . . with figures of all the plants. 26 vols. (in 27). Col. pls. fol. 1770-75. (C)
- Exotic botany illustrated, in thirty-five figures of elegant Chinese and American shrubs, etc. 2nd ed. Col. pls. fol. 1772. (C)
- A decade of curious and elegant trees and plants . . . from the East Indies and America. Illus. fol. 1773. (C)
- Twenty-five new plants, rais'd in the Royal Garden at Kew; their history and figures. Illus. fol. 1773. (2)
- The construction of timber, from its early growth; explained by the microscope. 2nd ed. Col. pls. fol. 1774. (C)
- Ed. See RHEEDE TOT DRAAKENSTEIN, H. A. VAN. Horti Malabarici pars prima.
- Hine, Mrs. Walter R.** New flower arrangements. Illus. 8vo. New York & London, 1936. (2)
- Hitchcock, Albert Spear.** Manual of the grasses of the United States. (U.S. Dep. Agr. Misc. Publ., 200.) Illus. 8vo. Washington, D.C., 1935. (2)
- Hoare, A. H.** See GARNER, H. V., & OTHERS. Profit from fertilizers.
- Hodgson, William.** Flora of Cumberland . . . with a chapter on the soils of Cumberland by J. G. GOODCHILD. Map. 8vo. Carlisle, 1898. (2)
- Hoffmann, Georg Franz.** Historia Salicum iconibus illustrata. Vol. 1; vol. 2, fasc. i (all published). Illus. fol. Leipzig, 1785-91. (C)
- Holbrook, Alec Wellesley.** A dictionary of British wayside trees. Illus. 8vo. (1936.) (1)
- Hole, Samuel Reynolds.** A book about roses. 2nd ed. 8vo. Edinburgh & London, 1870. (C)
- Holland.** Naturkundige Commissie in Oost-Indie. Verhandelingen over de natuurlijke geschiedenis der Nederlandsche overzeesche bezittingen . . . uitgegeven door C. J. TEMMINCK. Botanische-Kruidkunde door P. W. KORTHALS. Col. pls. Illus. fol. Leiden, 1839-42. (C)

- Holmes, T. C., & Hay, Robert E. The gardener's handbook. Illus. 16mo. (1936.) (1)
- Holsteyn, Pieter. [Unpublished paintings of plants.] Col. pls. fol. n.p., [17th or 18th cent.]. (C)
- Hooker, Sir Joseph Dalton. The botany of the Antarctic voyage of H.M. discovery ships Erebus and Terror in the years 1839-43. 1, Flora Antarctica. 2 vols. Col. pls. Illus. 4to. 1844-47. (C)
- Hooker, Sir William Jackson. See BOTANICAL MAGAZINE.
- See CURTIS, WM., & OTHERS. Flora Londinensis.
- [— Illus.] See TURNER, D. Muscologia Hibernicae.
- Hooker, Sir William Jackson, & Taylor, Thomas. Muscologia Britannica. 2nd ed. Illus. 8vo. 1827. (C)
- Hope, Charles William Webley. The ferns of north-western India. (Journ. Bombay Nat. Hist. Soc., xii-xv.) Illus. 8vo. [Bombay], 1899-1903. (2)
- House, Homer Doliver. Wild flowers of New York. (N.Y. State Mus. Mem., 15.) 2 vols. Col. pls. Illus. 8vo. Albany, N.Y., 1918. (C)
- Houstoun, William. Reliquiae Houstounianae: seu plantarum in America meridionali a GULIELMO HOUSTOUN collectarum icones, etc. Illus. 4to. 1781. (C)
- Hruby, Johann. Campanulastudien innerhalb der *Vulgares* und ihrer Verwandten. (Magyar Bot. Lapok, 1930.) Illus. 8vo. Budapest, 1930. (2)
- Hu, Hsen Hsu, & Ching, Ren Chang. Icones Filicum Sinicarum. Fasc. 1. Illus. fol. Nanking & Peking (Peiping), 1930. (C)
- Hubert, Ernest E. An outline of forest pathology. Illus. 8vo. New York, 1931. (2)
- Humboldt, F. H. Alexander von, Baron, & Bonpland, Aimé. Voyage aux régions équinoxiales. Partie 6, Botanique. Col. pls. Illus. fol. Paris, [1805-] 1808-18 [-24].
- Sect. 1. Plantes équinoxiales, recueillies au Mexique, dans l'île de Cuba . . . aux Andes, . . . et sur les bords du Rio-Negro, etc. 2 vols. Illus. fol. Paris, [1805-] 1808-09 [-17].
- Sect. 2. Monographie des Melastomacées.
- Part i. Melastomae. Col. pls. fol. Paris, [1806-] 1816.
- Part ii. Rhexies (*incomplete*, i.e. pp. 1-80, tt. 1-30). Col. pls. fol. Paris, [?] 1806-] 1809 [-13].
- Sect. 4. Mimoses et autres plantes légumineuses du nouveau continent . . . par C. S. KUNTH. Col. pls. fol. Paris, 1819 [-24]. (C)
- Husemann, C. Zum Kartoffelbau auf Hochmoorboden. (Pflanzenbau, x.) 8vo. Leipzig, 1933. (2)
- Hyde, Harold Augustus. Welsh timber trees, native and introduced. 2nd ed. Illus. 8vo. Cardiff, 1935. (1)
- Hyde, Harold Augustus, & Wade, Arthur Edward. Welsh flowering plants; a handbook to the collection in the Welsh National Herbarium. Illus. 8vo. Cardiff, 1934. (1)
- Iinuma, Yokusai. Sōmoku-dusets (illustrated flora of Japan). 2nd ed. by YOSHIO TANAKA & MOTYOUSHI ONO. 21 vols. (in 11). Col. pls. Illus. 8vo. Tokyo, [1874-75]. (C)
- Ion Gardener. The feats of gardening. See AMHERST, A. M. T.
- Irvine, Frederick Robert. West African botany. Illus. 8vo. Oxford, 1931. (2)
- Ives, Eli. Botanical description of the *Tillaea connata*, and *Limosella subulata*. (Trans. Physico-Med. Soc. N.Y., i.) Illus. 8vo. New York, 1817 (*typescript copy*).
- Jackson, Albert Bruce. Catalogue of the trees and shrubs (excluding rhododendrons) at Borde Hill, Sussex, in December 1932. With a foreword and notes by STEPHENSON ROBERT CLARKE. Illus. 8vo. Oxford, 1935. (11)
- See CLINTON-BAKER, H. W. Illustrations of new conifers.

- Jacquín, Nicolaus Joseph von. *Selectarum stirpium Americanarum historia . . . adjectis iconibus ab autoris archetypa pictis.* 3 vols. Col. pls. fol. [Vienna, c. 1780.] (C)
- Jahandiez, Émile. See ALBERT, A. *Catalogue . . . du Var.*
- James, John. *Transl.* See [DEZALIER D'ARGENVILLE, A. J.] *The theory . . . of gardening.*
- James, William Owen, & Clapham, Arthur Roy. *The biology of flowers.* Illus. 8vo. Oxford, 1935. (1)
- Janczewski, Edward. *Suppléments à la monographie des groseilliers, 1-3, 5.* (Bull. Acad. Sci. Cracovie, Sci. math. nat.) Illus. 8vo. Cracow, 1909-13. (2)
- Janka, Victor de. *Amaryllideae, Dioscoreae et Liliaceae Europaeae analytice elaboratae.* (Termész. Füzet., x.) 8vo. [Budapest], 1886. (2)
- Janson, Theodor. See RHEEDE TOT DRAAKENSTEIN, H. A. VAN. *Horti Malabarici pars prima.*
- [Japanese and other flowers, paintings of.] See [PAINTINGS].
- Jardin, Le. *Journal d'horticulture générale. 1e-17e année.* 17 vols. Col. pls. Illus. 8vo. Paris, 1887-1904. (2)
- Jardinier François, Le. See [BONNEFONS, N. DE].
- Jaubert, Hippolyte François, Count, & Spach, Eduard. *Illustrationes plantarum Orientalium.* 5 vols. Illus. fol. Paris, 1842-57. (2)
- *Exposition des familles naturelles et de la germination des plantes.* 2 vols. Col. pls. Illus. 4to. Paris & Strasbourg, 1805. (C)
- Jaume Saint-Hilaire, Jean Henri. *Traité des arbres forestiers . . . précédé d'une instruction sur la culture des arbres par [ANDRÉ] THOUIN.* Col. pls. 4to. Paris, 1824. (C)
- *Traité des arbrisseaux et des arbustes cultivés en France . . . précédé d'une instruction sur la culture par [ANDRÉ] THOUIN.* 2 vols. Col. pls. 4to. Paris, 1825. (C)
- *La flore et la pomone françaises, ou histoire et figure en couleur des fleurs et des fruits de France ou naturalisés sur le sol français.* 6 vols. Col. pls. Illus. fol. Paris, 1828-33. (C)
- Jéhan, L. F. *Botanique et physiologie végétale.* Illus. 8vo. Tours, 1897. (C)
- Jekyll, Gertrude. *Preface.* See MILLER, W. *Charm of English gardens.*
- Jellicoe, Geoffrey Alan. *Garden decoration and ornament for smaller houses.* Illus. 8vo. (1936.) (1)
- Jessen, Carl. *Ed.* See ALBERTUS MAGNUS. *De vegetabilibus.*
- Johanet, Auguste. *Préface.* See THIERY, —, *De la guérison des pommes de terre.*
- Johansson, Emil, & Callmar, Gunnar. *Befruktnings förhållanden hos päron.* (Sveriges Pomol. Foren. Årsskr) Illus. 8vo. Stockholm, 1936. (3)
- Jones, James Edmund. *Some familiar wild flowers.* Illus. 8vo. Toronto, [1930]. (12)
- Jones, J. F. *Propagating nut trees.* Illus. 4to. Lancaster, Pa., [19—]. (2)
- Joy, Norman H. *How to know British birds.* Col. pls. Illus. 8vo. (1936.) (1)
- Kamlah, H. *Untersuchungen über die Befruchtungsverhältnisse bei Kirschen- und Birnsorten.* (Gartenbauwiss., i.) Illus. 8vo. Berlin, 1928.
- Kanehira, Ryôzô. *An enumeration of Micronesian plants.* (Journ. Dept. Agr., Kyushu Imp. Univ., iv. 6.) Map. 8vo. Fukuoka, 1935. (2)
- Karsch, Anton. *Vademecum botanicum. Handbuch zum Bestimmen der in Deutschland wildwachsenden, sowie . . . kultivierten Pflanzen.* Illus. 8vo. Leipzig, 1894. (2)
- Keller, Johann Christoph. *Illus.* See SCHMIDEL, C. C. *Icones plantarum.*
- Kensit, Louisa. See BOLUS, H. *Contributions.** 1909.

(To be continued.)

EXTRACTS FROM THE PROCEEDINGS

OF THE

ROYAL HORTICULTURAL SOCIETY.

NOTICES TO FELLOWS.

SUBSCRIPTIONS.

Fellows and Associates are reminded that anyone elected to the Society between now and the close of the year will enjoy the privileges of Fellowship for the remainder of the year 1937 and will not be required to pay a further subscription until January 1, 1939. Back numbers of the monthly parts of the JOURNAL may be obtained by Fellows at *9d.* a number.

CALENDAR.

November 9, 12 noon to 5 P.M.—Fortnightly Meeting and Show of Flowers in season.

At 3.30 P.M. on *November 9*, in the Lecture Room of the New Hall, Lectures will be given by Mr. E. A. BOWLES, M.A., F.L.S., V.M.H., Mr. E. A. BUNYARD, F.L.S., and Mr. H. R. DARLINGTON, F.L.S., on "The Gardener's Library."

November 10 and 11, 2 P.M. to 4 P.M.—Practical Demonstration at Wisley (weather permitting) on the planting of fruit trees and Roses.

In the Old Hall the British Carnation Society holds its Show on *November 23* from 1 P.M. to 7.30 P.M., and on *November 24* from 10 A.M. to 5 P.M. Fellows' tickets admit free.

November 30, 12 noon to 5 P.M.—Fortnightly Meeting and Show of Flowers in season.

At 3.30 P.M. in the Lecture Room of the New Hall, on *November 30*, a Lecture will be given on "New Apples," by Mr. A. N. RAWES.

December 8 and 9, 2 P.M. to 4 P.M.—A practical demonstration will be given at Wisley (weather permitting) on pruning fruit trees. See below.

December 14, 12 noon to 5 P.M.—Fortnightly Meeting and Show of Flowers in season.

The Presidential Address of the Institute of Landscape Architects will be given at 3.30 P.M. on *December 14*, in the Lecture Room of the New Hall. Fellows interested are invited to attend.

PRACTICAL DEMONSTRATIONS AT WISLEY.

A demonstration on the planting of fruit trees and Roses will be given at Wisley on *November 10 and 11*, from 2 to 4 P.M., and one on the pruning of fruit trees on *December 8 and 9*, at the same hour. Fellows who intend to be present at either of these demonstrations are asked to inform the Director, R.H.S. Gardens, Wisley, Ripley, Surrey, beforehand, mentioning on which day they will attend, in order that adequate arrangements may be made.

SMALL EXHIBITS FROM FELLOWS.

Fellows are invited to exhibit interesting or well-grown plants, flowers, fruits or vegetables on the special small exhibits table. Any Fellow who desires to stage an exhibit consisting of not more than three pots, vases, or dishes may do so at any Fortnightly Meeting, although he has not applied for space beforehand. Such exhibits must be entered with the clerk at the small exhibits table by noon on the morning of the meeting, and he will provide exhibitors' cards and stage the exhibits. Exhibitors are not permitted to place on this special table any notice or leaflets, nor may any orders be booked there. Exhibits staged under this regulation may be considered for Certificates of Cultural Commendation.

FRUIT FOR NAMING.

At this time of the year there is always a large amount of fruit sent to the Committee for naming, and Fellows are reminded of the following instructions, which, if followed, will materially assist the Committee in their task of identification, and thus save Fellows from being disappointed owing to the Committee being unable to identify the fruit from the samples sent.

"Send at least three perfect specimens of a variety. Do not send until the fruits are mature, and then choose specimens representative of the particular variety. Avoid sending bruised, diseased or abnormal fruits. Include with each variety a typical shoot with foliage. Number each variety, preferably in Roman figures, by marking the skin with a hard pencil, and keep a record of the tree from which it is gathered. Labels are often displaced during transit. Wrap each fruit in paper and pack it carefully and securely in wood-wool or similar material. Flimsy cardboard boxes are usually crushed in the post, while scented-soap boxes taint the fruit and obscure its characteristic flavour. Give all the information you can respecting the age of the trees and how they are grown, *e.g.* indoors or out, as cordons, bushes, or standards, etc."

It is a convenience if specimens are sent so as to reach the office by the first post of the morning of a show day.

PICTURES, PLANS, PHOTOGRAPHS, ETC.

With the approach of winter, space will be available at Fortnightly Shows for pictures and photographs of plants, flowers, gardens, and plans or models of gardens. Regulations with regard to these exhibits may be had on application to the Secretary. The dates of the Shows when these exhibits are permitted are *November 9 and 30, December 14, 1937, and January 11 and 25, 1938.*

HORTICULTURAL SUNDRIES.

The exhibition of Horticultural Sundries will be allowed at the Fortnightly Shows on *November 30*, if space is available, *December 14, 1937, January 11 and 25, 1938.*

DATE OF CHELSEA SHOW, 1938.

The Calendar for 1938 has now been fixed, and will appear, as usual, in the January number of the JOURNAL, but in view of the fact that many Fellows may be desirous of making early arrangements it is thought that an early announcement of the date of the Chelsea Show will be welcomed. This Show will be held on Wednesday, Thursday and Friday, *May 25, 26 and 27, 1938.* The usual special notices will be sent to all Fellows in due course.

OTHER EVENTS IN 1938.

Annual Meeting: *February 22.*

Daffodil Show: *April 12 and 13.*

Early Market Produce Show: *April 12 and 13.*

Conference on Flowering Trees and Shrubs: *April 26, 27 and 28.*

LINDLEY LIBRARY.

Fellows are reminded of the conditions under which they may borrow books from the Lindley Library.

The Library is open daily (Sundays and holidays excepted) from 10 A.M. to 5 P.M. (Saturdays 10 A.M. to 1 P.M.). On Show days the Library will remain open until the close of the Show, except on two-day Shows, when it will be open until 6 o'clock on the first day of the Show.

The right of closing the Library at any time for purposes of rearrangement, cleaning, etc., is reserved. It will be closed annually for two weeks, usually between the first and second fortnightly meetings of the Society in July, in order that the books may be cleaned and the stock inspected. During this period Fellows will be able to consult books but not to borrow them.

The Fellows of the Society have access to the Library at all times when it is open.

Gardeners and others, not Fellows or Officers of the Society, must make application to the Secretary for permission to use the Library, and must enter their names and addresses in a book provided for that purpose.

Anyone requiring the loan of a book to be taken from the Library must make written application to the Secretary, and loans will be granted on the following conditions, viz. :

- (a) That the borrower be personally known to one or more of the Officers of the Society, or produce satisfactory references.
- (b) That the borrower sign a receipt for the volumes in a book provided for the purpose, before removing them from the premises, or, if unable to attend, acknowledge the receipt on a postcard ; and undertake to restore the books in good condition and to comply with the regulations.
- (c) That not more than three volumes be lent to one person at one time.
- (d) That borrowers through the post pay the postage both ways.

A certain discretion will be used as to what books shall be lent, but rare books which it would be difficult to replace, periodicals, expensive illustrated works and works of reference which are likely to be in frequent requisition within the Library itself may not be removed from the premises.

No books may be sent to Fellows resident abroad.

All books borrowed must be returned to the Library in good condition within one calendar month from the date of issue, and if sent by post must be properly protected and packed, but an extension of time may be granted on application.

The Secretary is empowered to demand of the borrowers such books as are detained beyond the prescribed time, and to take such steps as may be necessary to secure the prompt return of the same.

The loss of any book or any damage must be made good by the borrower.

Fellows requiring books on loan from the " Outlier " Libraries should make written application either to the Secretary of the Society or to the National Central Library for Students, Malet Street, London, W.C. 1.

The Trustees reserve the right of repealing or altering any of these regulations from time to time as may be required.

CATALOGUES.

At this season of the year new catalogues for the coming season usually arrive. Fellows are reminded that the Society maintains in the Lindley Library a valuable collection of catalogues, not only of the past but also of the present. The Keeper of the Library would be grateful if Fellows, when turning over their accumulation of catalogues, would think of the Library and forward any that they do not want to the Secretary. Catalogues of the past are often useful in providing evidence of the introduction of a plant to horticulture, or of the date of the raising of a new variety.

PUBLICATIONS.

Daffodil Year-Book.

The Daffodil Year-Book for 1937 is now available upon application to the Secretary, the price being 5s. in limp cover, and 6s. in stiff cover.

Lily Year-Book.

The Lily Year-Book for 1937 is also published, and may be obtained upon application to the Secretary, price 5s. in limp cover, 6s. in stiff cover.

R.H.S. Diary, 1938.

The R.H.S. Diary has now appeared for the twenty-seventh year, and it is pleasing to be able to state that it is the most popular gardeners' diary published. The price is 2s. 2d. post free, in Pluviusin with back loop and pencil ; 3s. 8d. post free in Morocco leather (not refillable) with pencil ; or 5s. 2d. post free in refillable Crocodile Case with card and stamp pockets.

HALL LETTINGS.

From November 8 to 13 an Exhibition of Applied Arts and Handicrafts will be held in the Old Hall. Particulars may be obtained from Miss N. E. Isaac, 26 Eastcastle Street, W. 1.

Our Dumb Friends' League will hold their annual Fair in the Old Hall on November 17 and 18. Inquiries should be addressed to the Secretary, Our Dumb Friends' League, 72 Victoria Street, S.W.

On November 18, in the New Hall, a Dance will be held in aid of Queen Charlotte's Hospital. Particulars may be obtained from Mrs. Cecil Raphael, Gloucester House, Park Lane, W.

A Bird Fancy Exhibition will be held in the New Hall on *December 2 to 4*. Inquiries should be addressed to The Marshall Press Ltd., Milford Lane, Strand, W.C. 2.

WISLEY IN NOVEMBER.

At this period of the year the interest of the Gardens is centred chiefly in two particular sections : first in the glasshouses, where the conditions allow plants to come to the flowering stage independent of outside conditions, and, secondly, among the trees and shrubs whose autumnal foliage, colour of stems, or quantity of fruit cannot be passed unnoticed.

In the first there will be a considerable display of Chrysanthemums in the second house, to follow the Fuchsias and Pelargoniums, whilst in the larger Temperate house the waxy blooms of *Lapageria rosea* and the crimson bells of *Abutilon insigne* hang from the roof supports ; in the border are noticeable the long red spikes of the showy *Epacris ardentissima*, and the yellow ones of the Acacias contrasted with the purple *Tibouchina semidecandra*.

Out of doors if the weather is favourable the chief autumn colouring now is likely to be found in the Wild Garden : Azaleas, Liquidambar, Oxydendrum, Enkianthus, Corylopsis, Vacciniums, and the little-known *Pieris mariana* from the eastern U.S.A., represented at Wisley by an excellent old specimen. At the top of the rock garden meadow is the Japanese Maple, one of the finest of small trees for autumn colouring, whose leaves fall in tones of brilliant scarlet or clear red.

Berry-bearing shrubs are very numerous, but the chief representatives are the Barberries, Cotoneasters, Pyracanthas, Malus (Crab Apples), Rosa, Stranvaesia, Euonymus, and the invaluable *Pernettya mucronata* which varies so much in colour of the fruits. A notable tree in Seven Acres, where most of these shrubs are situated, is the North American Scarlet Oak, *Quercus coccinea* var. *splendens*, whose leaves begin to turn colour in early October and hang a fiery red for many weeks. By the sides of the pond the stems of the Dogwoods, especially *Cornus stolonifera flaviramea* and *C. alba sibirica*, and many Willows glow in the sunshine, but some of this group are also worthy of planting for their autumn foliage tints. Such are *C. Baileyi* and *C. Amomum*, both to be seen here, but earlier in the season. An unusual shrub which actually flowers at this time is *Hamamelis virginiana*, with small scented yellow blossoms typical of its race, to which attention is usually drawn by the leaves turning a similar hue before falling.

In the Fruit Room near the Floral Trial Grounds and not far from the entrance gates the visitor will find many different varieties of Apples and Pears on exhibition throughout the winter, and from these one may both recognize previously unknown sorts and also discover the best for each month, as well as those which keep over the longest period.

GENERAL MEETINGS.

AUGUST 31, 1937.

A lecture was given by Mrs. V. HIGGINS, M.A., on "Desert Plants." Chairman: Mr. W. W. PETTIGREW, V.M.H.

SCIENTIFIC COMMITTEE.—Mr. J. W. ODELL in the Chair, and three other members present.

Pollination in Plums and Apples.—Mr. C. H. Hooper brought a list of Plums and Apples showing the time of flowering of each variety at Wye in 1937. He also gave an account of the results of his pollination experiments with the same fruits this year.

Potato tuber growth.—Mr. Preston showed a Potato tuber which had split, showing inside a stem and several young tubers. Dissection showed that the shoot had arisen from an eye and had grown inwards, splitting the parent tuber as it became larger. A second, smaller, shoot was also found embedded in the flesh of the old tuber with young tubers beginning to grow which had not yet swollen enough to split the tuber's skin.

Agapanthus hybrid.—Mr. Scrase-Dickins sent a scape of a hybrid he had raised between a small-flowered form of *Agapanthus africanus* and *A. inapertus*. The scape of the hybrid was 4 feet 6 inches in height and bore many more flowers than either of the parents. The flowers were about the size of the *A. africanus* parent and silvery-blue.

Cyrtanthus hybrid.—He also showed flowers of a hybrid of which *Cyrtanthus sanguineus* was one parent. The flowers were larger than those of *C. sanguineus*, of a brighter clear scarlet colour, and had a more campanulate tube to the perianth.

Geniana Makinoi.—Mr. Scrase-Dickins also sent a remarkably fine growth of *G. Makinoi* with stems about 3 feet high with two tiers of flowers.

Choananthus cyrtanthiflorus.—Lord Aberconway showed a striking Amaryllid from Mt. Ruwenzori which had received A.M. in 1928 under the name of *C. Wolastonii*. The two forms then distinguished by Dr. Rendle had been subsequently combined under the earlier specific name.

Rose flowering precociously.—The Director of Wisley showed a seedling Rose (*R. chinensis semperflorens*) flowering five months from seed-sowing. This Rose, under the name of Fairy Rose, was at one time frequently grown and valued for its rapid flowering.

FRUIT AND VEGETABLE COMMITTEE.—Mr. E. A. BUNYARD, F.L.S., in the Chair, and nine other members present.

Exhibits.

Messrs. Bunyard, Maldstone, Kent: collection of Apples, Pears and Damsons.

Mr. R. Brown, Hare Hill Nurseries, Pyrford, Woking: Apple 'Elsie Norman.'

Mr. A. J. Aplin, Godmersham Park, Canterbury, Kent: seedling Apple.

Messrs. Laxton, Bedford: Plums 'Laxton's Chieftain,' 'Laxton's Conqueror,' 'Laxton's Delightful,' 'Laxton's Reward,' 'Laxton's Gage,' and 'Laxton's Goldfinch.'

Mr. F. Streeter, Petworth Park, Petworth, Sussex: Plum 'Victoria.'

The Director, John Innes Horticultural Institution, Merton, S.W. 19: Blackberries *Rubus thyrsiger* and 'John Innes.'

Mr. E. A. Bunyard, Allington, Maidstone, Kent: Apple 'San Jancinto.'

Mr. H. Barnett, Westwood House, Tilehurst, near Reading: jam made from a type of Blackberry.

FLORAL COMMITTEE A.—Mr. D. INGAMELLS in the Chair, and ten other members present.

Awards Recommended:—

Gold Medal.

To Mr. S. Ogg, Swanley, for Dahlias.

Silver-gilt Banksian Medal.

To Messrs. Wakeley, London, for Gladioli.

Silver Flora Medal.

- To Messrs. Allwood, Haywards Heath, for Carnations.
- To Messrs. Brown & Such, Maldenhead, for Dahlias.
- To Messrs. Goodliffe, Bishops Stortford, for Delphiniums and Dahlias.
- To Messrs. Kelway, Langport, for Gladioli.
- To Messrs. Carter Page, London, for Dahlias.
- To Messrs. Vinten, Balcombe, for Chrysanthemums.

Silver Banksian Medal.

- To Messrs. Cheal, Crawley, for Dahlias.
- To Messrs. Engelmann, Saffron Walden, for Carnations.
- To Mr. E. Ladhams, Elstead, for herbaceous plants.
- To Mr. A. Perry, Enfield, for herbaceous plants.
- To Messrs. Wheatcroft, Nottingham, for Roses.
- To Messrs. Wood, Taplow, for Dahlias and herbaceous plants.

Banksian Medal.

- To Messrs. Bentall, Havering, for Roses.
- To Messrs. B. R. Cant, Colchester, for Roses.
- To Messrs. Carlile, Twyford, for herbaceous plants.
- To Messrs. Cheal, Crawley, for herbaceous plants.
- To Mr. E. B. Le Grice, North Walsham, for Roses.
- To Mr. A. Miles, Bickley, for herbaceous plants.
- To Messrs. M. Prichard, Christchurch, for herbaceous plants.
- To Messrs. Redgrove & Patrick, Sevenoaks, for Gladioli and herbaceous plants.
- To Messrs. Spencer, Hockley, for Dahlias.

Award of Merit.

- To Chrysanthemum 'Nyron' for cutting as a spray variety (votes unanimous), from Messrs. Buckwell, St. Mary Cray. See p. 510.
- To Rose 'Walter Bentley' (votes 9 for, 1 against), from Messrs. Wheatcroft, Nottingham. See p. 510.

Selected for trial at Wisley.

- Dianthus* 'Dellight,' from Messrs. Allwood, Haywards Heath.

Other Exhibits.

- Mr. W. E. B. Archer & Daughter, Sellindge: Roses.
- Messrs. Buckwell, St. Mary Cray: Chrysanthemums 'Caledonia,' 'Gaiety.'
- J. L. Holbrook, Esq., Chingford: Gladioli.
- Misses Hopkins, Coulsdon: herbaceous plants.
- Admiral A. Walker-Heneage-Vivian, C.B., M.V.O., Swansea: Fuchsia 'Rose of Castle.'

FLORAL COMMITTEE B.—Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and nine other members present.

Awards Recommended:—

Silver-gilt Banksian Medal.

- To Mr. and Mrs. W. F. Higgins, Croydon, for desert and succulent plants.

Silver Banksian Medal.

- To Messrs. Cheal, Crawley, for trees and shrubs.
- To Messrs. L. R. Russell, Windlesham, for Clematis and Vines.

Banksian Medal.

- To Mr. J. Klinkert, Richmond, for clipped Box bushes.
- To Mr. L. Lawrence, Bath Road, Taplow, for Cacti.
- To Messrs. M. Prichard, Christchurch, for rock plants.

Award of Merit.

- To *Erica verticillata* var. *major* as a flowering plant for the cool greenhouse (votes unanimous), from Lionel de Rothschild, Esq., Exbury House, Southampton. See p. 454.

Other Exhibits.

- Lord Aberconway, Bodnant, Tal-y-cafn: *Choananthus cyrtanthiflorus* (A.M. 1928) (See p. clxxii).
- Messrs. E. Ladhams, Elstead: *Buddleia Weyeriana* var.
- Lionel de Rothschild, Esq., Exbury: *Eucalyptus ficifolia*.
- Admiral A. Walker-Heneage-Vivian, C.B., M.V.O., Swansea: *Abutilon sinense*, *Diplazus glutinosus*, *Eupatorium micranthum*, *Campsis radicans*, *Cestrum Parqui*.
- Director, R.H.S. Gardens, Wisley: *Rosa setipoda*.
- Mr. R. Colpoys Wood, West Drayton: shrubs and dwarf Conifers.

ORCHID COMMITTEE.—Sir JEREMIAH COLMAN, Bart., in the Chair, and twelve other members present.

Awards Recommended:—

Award of Merit.

To *Vuykstevara* × 'Memoria H. H. Smith' (*Odontonia* × 'Nesta' × *Odontodia* × *Charlesworthii*) (votes 10 for, 2 against), from Messrs. Charlesworth, Haywards Heath. See p. 455.

Cultural Commendation.

To Mr. A. Everest, Orchid grower to Ernest R. Ashton, Esq., Broadlands, Tunbridge Wells, for *Cypripedium* × 'A. de Laresse,' with two spikes bearing four and three flowers respectively.

Other Exhibits.

Baron Bruno Schröder, Englefield Green: *Brassolaeliocattleya* × 'Elecktron.'
Messrs. Charlesworth, Haywards Heath: a group of Orchids.
Messrs. Stuart Low, Jarvis Brook: various species of Orchids.

JOINT DAHLIA COMMITTEE.—Mr. T. HAY, V.M.H., M.V.O., in the Chair, and ten other members present.

Dahlias selected for trial at Wisley.

From Messrs. Spencer, Hockley: 'Hockley Gem.'

From Messrs. Stredwick, St. Leonards-on-Sea: 'Dr. Stallard,' 'Earl Baldwin,' 'John Green,' 'Micky,' 'Starfish.'

From Mr. J. S. Wallis, Histon: 'Andrew' (Pompon), 'Yellowhammer' (Pompon).

Dahlias were also exhibited by B. G. C. Bolland, Esq., Billericay; B. Joel, Esq., St. Albans.

SEPTEMBER 7, 1937.

JOINT ROCK GARDEN PLANT COMMITTEE.—The Viscountess BYNG OF VIMY in the Chair, and ten other members present.

Awards Recommended:—

Award of Merit.

To *Cyclamen neapolitanum album* as a flowering plant for the rock garden and alpine house (votes unanimous), from Miss E. A. Britton, Tiverton; Dr. P. L. Gluseppi, Felixstowe; Messrs. W. E. Th. Ingwersen, East Grinstead. See p. 510.

Preliminary Commendation.

To *Diosphaera asperuloides* as a flowering plant for the rock garden and alpine house (votes 6 for), from Messrs. W. E. Th. Ingwersen, East Grinstead.

To *Thymus* sp. (Balls) as a flowering plant for the rock garden and alpine house (votes 4 for), from Dr. P. L. Gluseppi, Felixstowe.

Other Exhibits.

Miss E. A. Britton, Tiverton: *Coriaria* sp., *Leucanthemum* sp. Balls 2824.

Dr. P. L. Gluseppi, Felixstowe: *Liriope Muscari*, *Witsemia corymbosa*.

The Director, R.H.S. Gardens, Wisley: *Tetranuris acaulis*.

JOINT DAHLIA COMMITTEE.—Mr. D. B. CRANE in the Chair, and ten other members present.

Dahlias selected for trial at Wisley.

From S. C. Bailey, Esq., Hinckley: 'Sid Bailey.'

From Messrs. Bruldegom, Baarn, Holland: 'Beauty of the Garden,' 'Bolide.'

From Messrs. Carlee, Haarlem, Holland: 'Gladiator,' 'Golden Glory,' 'Liberty' (to be renamed).

From Messrs. Cheal, Crawley: 'Killarney.'

From Messrs. De Ruyter, Oegstgeest, Holland: 'Patty Waugh.'

From C. A. Hay, Esq., Hindhead: 'Mary Moseley.'

From Messrs. Hewitt, Stratford-on-Avon: 'Market Jewel.'

From Messrs. Hock, The Hague, Holland: 'Scarlet Wonder.'

From Messrs. Stredwick, St. Leonards-on-Sea: 'Killarney.'

From Messrs. Treseder, Cardiff: 'Blodwen.'

From Mr. J. S. Wallis, Histon: 'Edwin.'

From Mr. J. T. West, Brentwood: 'Alpha,' 'David Ingamells,' 'England,' 'Little Dorothy,' 'Pauline Gibbard,' 'Tarn House.'

Dahlias were also exhibited by A. Arnold, Esq., Ipswich; Messrs. Ballego, Leiden, Holland; Mrs. G. Brown, Wrotham; Rev. J. F. Douglas, Sheering; Messrs. Duyn, Sautpoort, Holland; Mr. G. Elsom, Spalding; Messrs. Hemerick, Leiden, Holland; M. L. Hudson, Esq., Wrotham; Messrs. Maarse, Aalsmeer, Holland; F. W. Martin, Esq., Huddersfield; G. P. Roddam, Esq., Tunbridge Wells; Messrs. Topsvoort, Aalsmeer, Holland; Messrs. Visser, Hillegom, Holland; Mr. J. Watson, Woking.

SEPTEMBER 14, 1937.

SCIENTIFIC COMMITTEE.—Mr. A. D. COTTON, O.B.E., F.L.S., in the Chair, and four other members present.

Branching Oats.—Dr. Voelcker showed a specimen of the branching Oat to which reference has already been made, which was grown in the fields of Mr. S. E. Buxton, Cropton Hall, Heydon, Norfolk. He had ascertained that similar branching in Barley and Wheat was sometimes met with.

FRUIT AND VEGETABLE COMMITTEE.—Mr. E. A. BUNYARD, F.L.S., in the Chair, and nine other members present.

Exhibits.

Mr. H. Dunkin, The Chase, 222 Cuppington Road, Leamington Spa : Apple 'Dunkin's Seedling.'

Mr. R. Holder, The Lodge, Samanes Manor, Jersey, C.I. : seedling Apple.

The Director, John Innes Horticultural Institute, Mostyn Road, Merton Park, S.W. 19 : Blackberry 'Merton Thornless.'

Messrs. Rivers & Son, Sawbridgeworth, Herts. : Peach 'H. S. Rivers.'

R.H.S. Commercial Fruit Trials, Wisley : Apple 'Gravenstein' (two forms).

Mrs. Salmon, Mona House, Okehampton : seedling Apple.

Mr. A. Steele, Mallocks, Tipton St. John, Devon : seedling Peach.

FLORAL COMMITTEE A.—Mr. G. W. LEAK, V.M.H., in the Chair, and ten other members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. Dobbie, Edinburgh, for Dahlias.

Silver-gilt Banksian Medal.

To Messrs. Carter Page, London, for Dahlias.

To Mr. J. B. Riding, Chingford, for Dahlias.

To Messrs. Spencer, Hockley, for Dahlias.

Silver Flora Medal.

To Messrs. Blackmore & Langdon, Bath, for Begonias.

To Messrs. Brown & Such, Maldenhead, for Dahlias.

To Messrs. Daniels, Norwich, for Gladioli.

To Mr. E. Ladhams, Elstead, for herbaceous plants.

To Messrs. Wakeley, London, for Gladioli.

Silver Banksian Medal.

To Messrs. Allwood, Haywards Heath, for *Dianthus Allwoodii*.

To Messrs. Cheal, Crawley, for Dahlias.

To Messrs. Kelway, Langport, for Gladioli.

To Messrs. Prichard, Christchurch, for herbaceous plants.

To Messrs. Vinten, Balcombe, for Chrysanthemums.

To Messrs. Wood, Taplow, for Dahlias and herbaceous plants.

Flora Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.

To Messrs. Engelmann, Saffron Walden, for Carnations.

Banksian Medal.

To Messrs. Buckwell, St. Mary Cray, for Chrysanthemums.

To Messrs. B. R. Cant, Colchester, for R. 'J.'

To Messrs. Kelway, Langport, for annual Asters.

To Mr. E. B. Le Grice, North Walsham, for Roses.

To Mr. A. Miles, Bickley, for herbaceous plants.

To Mr. F. W. Reay, Northfield, for Violas and Pansies.

Selected for trial at Wisley.

Dwarf African Marigold 'Hatfield King's Cup,' from Messrs. Ryder, St. Albans.

Lobelia cardinalis 'Kelmscott,' from Mr. E. H. Barker, Ipswich.

The following award was recommended after trial at Wisley.

Award of Merit.

To *Chrysanthemum coronarium* 'Golden Crown,' from Messrs. Hurst, London.

See p. 510.

Other Exhibits.

Mr. W. E. B. Archer & Daughter, Sellindge : Roses,

Miss F. M. Bennett, Fleet : Pelargonium 'Wood Norton Gem.'

Messrs. Bentall, Havering : Roses.

Messrs. Carlile, Twyford : herbaceous plants.

Misses Hopkins, Coulsdon : hardy plants.
 Mr. F. W. Reay, Northfield : Pansy 'D. J. Reay.'
 Mr. E. Riley, Alfreton : Chrysanthemum 'Mercury.'
 Messrs. W. H. Simpson, Birmingham : Antirrhinum seedling.
 Messrs. Wheatcroft, Nottingham : Roses.

FLORAL COMMITTEE B.—Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and eleven other members present.

Awards Recommended :—

Flora Medal.

To Mr. L. Lawrence, Taplow, for succulents.
 To Mr. J. Robinson, Eltham, for rock garden plants.

Banksian Medal.

To Mr. J. Klinkert, Richmond, for clipped Box trees.
 To Messrs. Maxwell & Beale, Broadstone, for hardy Heaths.
 To Messrs. Russell, Windlesham, for Clematis and other shrubs.
 To Messrs. Southgate, New Malden, for succulents.

Preliminary Commendation.

To *Aristea cyanea* as a flowering plant for the cool greenhouse (votes unanimous), from Collingwood Ingram, Esq., Benenden.

Other Exhibits.

Mr. A. Corderoy, Eltham : rock garden plants.
 The Rt. Hon. Lord Rockley, Poole : *Araujia sericofera*, *Eucalyptus viminalis*, *E. MacArthurii*.
 L. de Rothschild, Esq., Exbury : *Tricyrtis formosana*, *Berberis* sp. K.W. 5936, *Leonotis Leonurus*.
 Messrs. Russell, Windlesham : *Clematis Jouiniana* Spingarn's var.
 Messrs. Watson, Killiney, Co. Dublin : *Pittosporum tenuifolium* var. *gracile*, *P. tenuifolium* 'Silver Queen,' *Eucryphia* × 'Nymansay' var. 'Mount Usher.'
 Mr. R. Colpoys Wood, West Drayton : shrubs.

ORCHID COMMITTEE.—E. R. ASHTON, Esq., in the Chair, and eight other members present.

No awards were recommended on this occasion.

Exhibit.

W. J. Kaye, Esq., Surbiton : *Ionopsis paniculata* (F.C.C. 1880).

JOINT DAHLIA COMMITTEE.—Mr. D. B. CRANE in the Chair, and nine other members present.

Dahlias selected for trial at Wisley.

From Messrs. Ballego, Lelden, Holland : 'Tante Stien.'
 From Mr. E. J. Barker, Ipswich : 'Kelmscott.'
 From Messrs. Torrance & Hopkins, Glasgow : 'Peace.'
 From Mr. J. T. West, Brentwood : 'George' (Small Dec.), 'Malsie' (Med. Dec.), 'Ruskin' (Small Cactus), 'Wasdale' (Small Cactus).

Dahlias were also exhibited by Mr. F. Elliott, Crewkerne; Mr. B. Lake, Hunstanton; Mr. A. Noad, Exmouth; Messrs. Spencer, Hockley.

BOOKS ADDED TO THE LIBRARY, 1936.

(Continued from p. CLXVIII.)

- Kerner, Johann Simon.** Hortus sempervirens, exhibens icones plantarum selectorum. Vols. 1-21, 23 (*incomplete*). Col. pls. Illus. fol. Stuttgart, 1796-1808. (C)
- Le raisin, ses espèces et variétés, dessinées et colorées d'après nature. Livr. 1, 2, 4. Col. pls. fol. Stuttgart, 1803-08. (C)
- Kerner von Marilaun, Anton, & others.** Schedae ad floram exsiccata Austro-Hungaricam. See VIENNA. UNIVERSITÄT.
- King, Thomas.** Appendix. See HENNEDY, R. Clydesdale flora. 5th ed.
- Kirchner, Otto, & others.** Die Coniferen und Gnetaceen Mitteleuropas in ihren gesamten Lebenserscheinungen, etc. Unter Mitwirkung von M. RIKLI, herausgegeben von O. KIRCHNER, E. LOEW, C. SCHROTER. (Lebensg. Blütenpfl. Mitteleur., i.) Illus. 8vo. Stuttgart, 1906. (2)
- Kirk, Thomas.** The students' flora of New Zealand and the outlying islands. 8vo. Wellington, N.Z., [1899]. (C)
- Knight, Joseph [& Salisbury, Richard Anthony].** On the cultivation of the plants belonging to the natural order of *Proteeae*, with their generic as well as specific characters, etc. Col. pl. 4to. 1809. (C)
- Knoblauch, Emil.** Beiträge zur Kenntniss der Gentianaceae. (Bot. Centralbl., lx.) 8vo. Cassel, 1894. (2)
- Knoop, Johann Hermann.** Fructologia, of beschryving der vrugtbomen en vrugten, etc. Col. pls. fol. Leeuwarden, 1763. (C)
- (another, smaller edition). Col. pls. fol. Leeuwarden, n.d. (C)
- Dendrologia, of beschryving der plantagie-gewassen, etc. fol. Leeuwarden, 1763. (C)
- (another, smaller ed.) fol. Leeuwarden, n.d. (C)
- Pomologia, dat is beschryvingen en afbeeldingen van de beste soorten van appels en peeren. Col. pls. fol. Leeuwarden, 1758. (C)
- (another, smaller edition.) Col. pls. fol. Leeuwarden, n.d. (C)
- Koehn, Alfred.** The way of Japanese flower arrangement. Col. pl. Illus. 8vo. 1935. (2)
- Koehne, Emil.** Deutsche Dendrologie. Kurze Beschreibung der in Deutschland im Freien aushaltenden Nadel- und Laubholzgewächse. Illus. 8vo. Dresden, 1893. (2)
- Kohler, Alwin.** Der systematische Wert der Pollenbeschaffenheit bei der Gentianaceen. Inaugural-Dissertation . . . Zürich. (Mitteil. Bot. Mus. Univ. Zürich, 25.) Illus. 8vo. Zürich, 1905. (2)
- Koker, Aegidius van.** Plantarum usua" in horti medici Harlemensis catalogus. 8vo. Haarlem, 1702. (2)
- Korso, Emil.** Ugressfrø. Unkrautsamen. Weed seeds. Col. pls. 4to. Oslo, 1935. (2)
- Korthals, Pieter Willem.** Kruidkunde. See HOLLAND. NATURKUNDIGE COMMISSIE. Verhandelingen. Botanie.
- Košanin, Nedeljko.** *Narietium scardicum* spec. nova. (Oest. Bot. Zeitsch.) Illus. 8vo. [Vienna], 1913. (2)
- *Dioscorea balcanica* Koš. n. sp. (Oest. Bot. Zeitsch.) Illus. 8vo. [Vienna], 1914. (2)
- Ed. See BELGRADE. UNIVERSITY BOTANIC GARDEN. Glasnik.
- Kouwenhoorn, Pieter van.** Illus. ["Verzameling van Bloemen naar de Natuur geteekend": original coloured drawings of cultivated plants.] Col. pls. fol. n.p., [17th or early 18th cent.]. (C)
- [**Kraft, Johann.**] Pomona Austriaca, ou arbres fruitiers d'Autriche. 2 vols. Col. pls. fol. Vienna, 1897. (C)

- Krieger, Louis C. C. The mushroom handbook. Illus. 8vo. New York, 1936. (1)
- Kuck, Loraine E., & Tongg, Richard C. The tropical garden: its design, horticulture, and plant materials. Illus. 8vo. New York, 1936. (1)
- Kudo, Yushun. See MIYABE, K. Icones of . . . forest trees of Hokkaido.
- Kunth, Karl Sigismund. Mimoses et autres plantes légumineuses. See HUMBLDIT, F. H. A. VON, & BONPLAND, A. Voyage. Botanique. Sect. 4. (C)
- Labyrinte de Versailles. See VERSAILLES.
- Lambert, Aylmer Bourke. A description of the genus *Pinus* . . . to which is added an appendix, . . . and an account of the Lambertian herbarium by DAVID DON. 2nd ed. 2 vols. Col. pls. Illus. fol. 1828. (C)
- (another copy, with fewer plates). (C)
- Vol. 3. Col. pls. fol. 1838. (C)
- (another copy; plates different). (C)
- Lanjouw, Joseph. The Euphorbiaceae of Surinam. Proefschrift . . . Utrecht. Illus. 8vo. Amsterdam, 1931. (2)
- Lankester, Sir Edwin Ray. From an easy chair. 8vo. 1908. (C)
- Science from an easy chair. Col. pl. Illus. 8vo. [1910.] (C)
- L'Aubinière, C. A., & L'Aubinière, G. M. de. Illus. The poetry of Kew Gardens from paintings by M. and Mme. C. A. DE L'AUBINIÈRE . . . with an introduction by W. T. THISELTON-DYER. Illus. fol. 1896. (13)
- L'Aubinière, G. M. de, Mrs. Illus. See L'AUBINIÈRE, C. M. DE.
- Lawrence, Julia R. See ROBERTS, E. A. American ferns.
- Leblond, Alexandre. The theory and practice of gardening. See [DEZALIER D'ARGENVILLE, A. J.].
- Le Bouteux, —. See LE NOTRE, A. Jardins.
- Ledermuller, Martin Frobené. Amusement microscopique. Col. pls. 4to. Nürnberg, 1764. (C)
- Deuxieme cinquantaine des amusemens microscopiques. Col. pls. 4to. Nürnberg, 1766. (C)
- Troisième cinquantaine des amusemens microscopiques. Col. pls. 4to. Nürnberg, 1768. (C)
- Ledoulx, Pierre, & others. Illus. [Coloured drawings of cultivated plants, mostly vegetables grown in Belgium, lettered as "Collection du regne végétal dessinée et peinte d'après nature . . . par PIERRE LEDOULX, Mrs. J. F. DUCQ et JEAN VERBRUGGE." Col. pls. fol. n.p., [c. 1800-31]. (C)
- Illus. See VERBRUGGE, J. C. [Coloured drawings.]
- Lee, Shun-Ching. Forest botany of China. Preface by ALFRED REHDER. Illus. 8vo. Shanghai, 1935. (2)
- Le Notre, André, & others. Jardins, parterres, portiques et berceaux de treillage de l'invention des Sieurs LE NOTRE, LE BOUTEUX et TOUCHAR. Illus. 4to. Paris, 1680. (C)
- Leonhardt, Rudolf. Studien über die Verbreitung von *Cyclamen europaeum* in den Ostalpen und deren Umrandung. (Oest. Bot. Zeitsch., lxxvi.) Map. 8vo. Vienna, 1927. (2)
- Lereache, Louis, & Levier, Émile. Decas plantarum novarum in Hispania collectarium. (Journ. of Bot., xvii.) 8vo. 1879. (2)
- Deux excursions botaniques dans le nord de l'Espagne et le Portugal en 1878 et 1879. Illus. 8vo. Lausanne, 1880. (2)
- Leroy, Chavée. See CHAVÉE-LEROY.
- Letellier, Jean Baptiste Louis. Flore universelle. Vol. 1. Col. pls. 4to. [Paris], 1849 [-51]. (C)
- Leth, Hendrik de. Illus. See BROUËRIUS VAN NIDEK, M. Het zegenpralend Kennemerland.
- Lettsom, John Coakley. The natural history of the tea-tree, with observations on the medical qualities of tea and on the effects of tea-drinking. 2nd ed. Col. pls. 4to. 1799 [probably 1800]. (C)

- Léveillé, Augustin Abel Hector. Catalogue des plantes du Yun-nan, avec renvoi aux diagnoses originales, etc. Illus. 8vo. Le Mans, 1916 (-17). (C)
- Lévier, Émile. See LERESCHE, L.
- L'Heritier de Brutelle, Charles Louis. *Cornus*: specimen botanicum. Col. pls. Illus. fol. Paris, 1788 (actually 1789). (C)
- Liboschitz, Joseph, & Trinius, Karl Bernhard. Flore des environs de St.-Petersbourg et de Moscou. Vol. 1 (all published). Col. pls. 4to. St. Petersburg, 1811. (C)
- Liebmänn, Frederik Michael, & Ørsted, Anders Sandøe. Chênes de l'Amérique tropicale. Iconographie des espèces nouvelles ou peu connues. Ouvrage posthume de F. M. LIEBMANN, achevé et augmenté . . . par A. S. ØRSTED. Illus. fol. Leipzig, 1869. (C)
- Liger, Louis. See GENTIL, F. The retir'd gard'ner.
- [Lilies, Japanese, Coloured plates of.] Illus. 4to. n.p., n.d. (C)
- Lindley, John. Collectanea botanica. Col. pls. Illus. fol. 1821. (C)
- Link, Heinrich Friedrich, & Otto, Friedrich. Icones plantarum selectarum horti Regii botanici Berolinensis.—Abbildungen auserlesener Gewächse, etc. 10 parts. Col. pls. Illus. 4to. Berlin, 1820-28. (C)
- Icones plantarum rariorum horti Regii botanici Berolinensis.—Abbildungen neuer und seltener Gewächse, etc. Vol. 1. (all published). Col. pls. Illus. Berlin, 1828 [-31].
- Linnaeus, Carl, afterwards Linné, Carl von. Amoenitates academicae seu dissertationes variae physicae, medicae, botanicae . . . curante JO. CHRISTIANO DANIELE SCHREBERO. 10 vols. Illus. 8vo. Erlangen, 1787-90. (2)
- Systema, genera, species plantarum uno volumine . . . sive codex botanicus Linnaeanus . . . edidit brevique adnotatione explicavit HERRMANNUS EBERHARDUS RICHTER. 4to. Leipzig, [1836-] 1840. (2)
- Index alphabeticus generum, specierum ac synonymorum . . . edidit GUIL. LUDOV. PETERMANN. 4to. Leipzig, 1840. (2)
- Lockley, Doris. Illus. See LOCKLEY, R. M. Birds of the Green Belt.
- Lockley, R. M. Birds of the Green Belt and the country around London. With plates and sketches by DORIS LOCKLEY. Illus. 8vo. [1936.] (1)
- Loddiges, Conrad, & Sons. Catalogue of plants . . . at Hackney, near London. 11th ed. 8vo. 1818. (C)
- 12th ed. 8vo. 1820. (C)
- 13th ed. 8vo. 1823. (C)
- 14th ed. 8vo. 1826. (C)
- Loew, Ernst. See KIRCHNER, O. Die Coniferen.
- Loiseleur-Deslongchamps, Jean L. A. Flore générale de France . . . Phanérogamie. Vol. 1 (all published). Col. pls. Illus. 8vo. Paris, 1828. (C)
- London, George, & Wise, Henry. Ed. See [GENTIL, F.] & LIGER, L. The retir'd gard'ner.
- Long, Harold Cecil. See GARNER, H. V., & OTHERS. Profit from fertilizers.
- Lorette, Louis. La taille Lorette. Av. . . préface de GEORGES TRUFFAUT. 2nd ed. Illus. 8vo. Versailles, 1914. (12)
- Lytton, Constance, Lady. Appendix. See EARLE, C. W. Pot-pourri.
- Macfadyen, James. The flora of Jamaica. Vol. 1. Ranunculaceae-Leguminosae. 8vo. 1837. (2)
- McLaren, Henry Duncan, 2nd Baron Aberconway. Foreword. See ALLWOOD, M. C. Carnations and all Dianthus. 1935.
- Macmillan, Hugh. Holidays on high lands: or, rambles and incidents in search of alpine plants. 8vo. 1869. (2)
- Macmillan, Hugh Fraser. Tropical planting and gardening with special reference to Ceylon. 4th ed. Col. pl. Illus. 8vo. 1935. (1)
- Maiden, Joseph Henry. A critical revision of the genus *Eucalyptus*. See BLAKELEY, W. F. A key.
- Maire, René. See BRAUN-BLANQUET, J. Contributions.
- Maiwald, Vinzenz. Geschichte der Botanik in Böhmen. 8vo. Vienna & Leipzig, 1904. (2)

- Makins, Frederick Kirkwood.** The identification of trees and shrubs . . . likely to be met with in the British Isles. Illus. 8vo. [1936.] (1)
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- Markham, Ernest.** Raspberries and kindred fruits. Illus. 8vo. 1936. (1)
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- Mayuranathan, P. V.** See GRAVELY, F. H. Indian species of the genus *Caralluma*.
- Measham, Miss C. E. C.** A botanical survey of some fields near Leicester. Map. 4to. Leicester, 1915.
- Meen, Margaret.** Exotic plants from the Royal Gardens at Kew. 2 parts. Col. pls. fol. [1790.] (C)
- Megenberg, Cunrat (or Conrad) von.** See CUNRAT VON MEGENBERG.
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- Menz, Johanna.** Beiträge zur vergleichenden Anatomie der Gattung *Allium* nebst einigen Bemerkungen über die anatomischen Beziehungen zwischen Alliioideae und Amaryllidoideae. (Sitz. Akad. Wiss. Wien, math.-nat., cxix.) Illus. 8vo. Vienna, 1910. (2)
- Menzies-Kitchin, A. W.** Land settlement, a report prepared for the Carnegie United Kingdom Trustees. 8vo. Edinburgh, 1935. (15)
- Merian, Maria Sibylla.** *Erucarum ortus, alimentum et paradoxa metamorphosis*. Illus. 4to. Amsterdam, [? 1717]. (C)
- *Dissertatio de generatione et metamorphosisibus insectorum Surinamensis: in qua * * plantae, flores & fructus * * exhibentur*. Illus. fol. Amsterdam, 1719. (C)
- *Illus.* Das kleine Buch der Tropenwunder: kolorierte Stiche von MARIA SIBYLLA MERIAN; Geleitwort von FRIEDRICH SCHNACK. Col. pls. 8vo. Leipzig, [193-]. (8)
- Merino, Baltasar.** *Flora descriptiva é ilustrada de Galicia*. 3 vols. Illus. 8vo. Santiago, 1905-1909. (C)
- *Adiciones a la flora de Galicia*. (Broteria, ser. bot., x-xv.) Illus. 8vo. Braga, 1912-17. (C)
- Meyer, Ernst Heinrich Friedrich.** Ed. See ALBERTUS MAGNUS. De vegetabilibus.
- Meyer, Georg Friedrich Wilhelm.** *Primitiae florae Essequeboensis*. Illus. 4to. Stuttgart, 1818. (2)

- Michaux, André.** *Flora Boreali-Americana, sistens characteres plantarum quas in America septentrionali collegit et detexit ANDREAS MICHAUX* [ed. by L. C. M. RICHARD, illus. by P. J. REDOUTÉ]. 2 vols. Illus. 8vo. Paris & Strasbourg, 1803. (C)
- Michel, Étienne.** *Traité du citronier* [extrait littéralement du *Nouveau Duhamel* . . . tome 7]. Les dessins . . . par P. BESSA. Col. pls. fol. Paris, 1816. (C)
- Micheli, Pier' Antonio.** *Catalogus plantarum horti Caesaris Florentini; opus postumum . . . locupletatum ab JO. TARGIONIO TOZZETTIO.* Illus. 4to. Florence, 1747. (C)
- Middleton, Cecil Henry.** *More gardening talks.* 8vo. [1936.] (1)
- Milde, Julius.** See MILDE, C. A. J.
- Milde, Carl August Julius.** *Botrychiorum* monographia. (Verhandl. zool.-bot. Ges. Wien, xix.) Illus. 8vo. [Vienna], 1869. (8)
- Miller, John.** Illus. See MÜLLER, J. S.
- Miller, Philip.** *The gardener's dictionary . . . abridged from the last folio edition.* 4th ed. 3 vols. Illus. 8vo. 1754. (16)
- Miller, Thomas.** *The poetical language of flowers; or the pilgrimage of love.* Col. pls. 8vo. 1847. (2)
- Miller, Wilhelm.** *The charm of English gardens. With a preface by GERTRUDE Jekyll.* Col. pls. Illus. 8vo. London, New York & Toronto, [1911]. (2)
- Miyabe, Kingo, & Yudo, Yushun.** *Icones of the essential forest trees of Hokkaido drawn by CHUSUKE SUZAKI.* 3 vols. Col. pls. fol. [? Sapporo], 1920-31. (C)
- Moldenke, Harold Norman.** *The observed flora of Watchung, N.J., and its immediate vicinity.* 3rd ed. 8vo. Watchung, N.J., 1934. (3)
- *Addenda and errata.* 4to. [Watchung, N.J.], 1935. (3)
- *A monograph of the genus Timotocia.* (Fedde, Rep. Sp. Nov., xxxix.) 8vo. [Berlin], 1936. (3)
- *A monograph of the genus Callicarpa as it occurs in America and in cultivation.* (Fedde, Rep. Sp. Nov., xxxix-xl.) 8vo. Berlin, 1936. (3)
- *A monograph of the genus Cornutia.* (Fedde, Rep. Sp. Nov., xl.) 8vo. [Berlin], 1936. (3)
- *A monograph of the genus Priva.* (Fedde, Rep. Sp. Nov., xli.) 8vo. Berlin, 1936. (3)
- *The flora of the Watchung Mountains.* (Torreya, xxxvi.) Illus. 8vo. [New York], 1936. (3)
- Moore, Henry J.** *The culture of flowers.* Col. pls. Illus. 8vo. Toronto, [1932]. (3)
- *The culture of hardy perennials and biennials.* Col. pls. Illus. 8vo. Toronto, [1934]. (3)
- Moore, Thomas.** Ed. See THOMPSON, R. *The gardener's assistant.* 3rd ed.
- Mooy, J. Polman.** [Articles.] See TULIP.
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- Mori, Tamezo.** *An enumeration of plants hitherto known from Corea.* Illus. 8vo. Seoul, 1922. (C)
- Morong, Thomas.** *The Smilacaceae of North and Central America.* (Bull. Torrey Bot. Club, xxi.) 8vo. [New York], 1894. (2)
- Mottet, Séraphin Joseph.** *Les Conifères et Taxacées, traité élémentaire et pratique.* Illus. 12mo. Paris, 1902. (2)
- Mottram, Ralph Hale.** Ed. *A scientific survey of Norwich and district, prepared for the Norwich meeting [of the British Association for the Advancement of Science], by various authors.* Map. 8vo. 1935. (17)
- Mulford, A. Isabel.** *A study of the Agaves of the United States.* (Ann. Rep. Missouri Bot. Gard., vii.) Illus. 8vo. [St. Louis, 1895.] (C)
- Müller, Johann Sebastian** (afterwards Miller, John). [Icones novae.] Col. pls. fol. 1780. (C)

- Möller, Johann Sebastian. *Illustratio systematis sexualis Linnaei. An illustration of the sexual system of LINNAEUS.* Col. pls. Illus. fol. [1770-] 1777. (C)
- [— *Illus.*] See STUART, JOHN. Col. pls. fol. 1780. Botanical tables.
- Murbeck, Svante. *De nordeuropeiska formerna af släktet Cerasium.* (Bot. Notiser.) 8vo. [Lund], 1898. (2)
- *Die nordeuropäischen Formen der Gattung Stellaria.* (Bot. Notiser.) 8vo. [Lund], 1899. (2)
- *Nachträge zur Monographie der Gattung Verbascum.* (Lunds Univ. Årssk., N.F., Av. 2, xxxii.) Illus. 8vo. Lund, [1936]. (14)
- Nachtmann, Xaver. *Blumen-und Früchten-Studien nach der Natur gezeichnet und lithographirt.* Col. pls. fol. Munich, [183-]. (4)
- Nakai, Takenoshin. *Ed. Iconographia plantarum Asiae orientalis.* Vol. 1, nos. i-iv. Illus. 8vo. Tokyo, 1935-36. (2)
- Nakai, Takenoshin, & others. *Contributio ad cognitionem florae Manchuricae.* By T. NAKAI, MASAJI HONDA & MASAO KITAGAWA. (Rep. 1st Sci. Exped. Manchoukuo, iv. 2.) Illus. 8vo. [Tokyo], 1935. (3)
- Nash, John, & Dallimore, William. *Poisonous plants, deadly, dangerous and suspect.* Edited by A. W. HILL. Illus. 4to. 1927. (C)
- National Institute of Agricultural Botany. See CAMBRIDGE.
- Neale, William Thomas. *Cacti and other succulents.* Illus. 8vo. Newhaven, [1935]. (1)
- Nelmes, Ernest. See SPRAGUE, T. A. *Herbal of Leonhart Fuchs.*
- Nelson, Erich. *Illus.* See OVERBECK, F. *Mittelgebirgsflora.*
- Němec, Bohumil, & others. *Über das Vorkommen von Gold in den Schachtelhalmen (Equisetum palustre und arvense).* By B. NĚMEC, J. BABIČKA, & O. OBORSKY. (Bull. internat. Acad. Sci. Bohême.) 8vo. [Prague], 1936. (3)
- Nestler, Anton. *Die hautreizende Wirkung der Primula obconica Hance und Primula sinensis Lindl.* (Ber. Deutsch. bot. Ges., xviii.) Illus. 8vo. Berlin, 1900. (2)
- *Hautreizende Primeln (Deutsche Arbeit, i.)* Illus. 8vo. Munich & Prague, [1901]. (2)
- *Das Secret der Drüsenhaare der Gattung Primula mit besonderer Berücksichtigung seiner hautreizenden Wirkung.* (Sitz. Akad. Wiss. Wien, math.-nat., cxi.) Illus. 8vo. Vienna, 1902. (2)
- *Die hautreizende Wirkung des Amberholzes (Liquidambar styraciflua L.).* (Ber. Deutsch. bot. Ges., xxix.) 8vo. Berlin, 1912. (2)
- *Cortusa Matthioli L., eine stark hautreizende Pflanze.* (Ber. Deutsch. bot. Ges., xxx.) Illus. 8vo. Berlin, 1912. (2)
- *Die hautreizende Wirkung des Coccolobolholzes [Coccoloba sp.].* (Ber. Deutsch. bot. Ges., xxx.) 8vo. Berlin, 1912. (2)
- *Ist Pastinak [Pastinaca sativa] hautreizend?* (Ber. Deutsch. bot. Ges., xxx.) 8vo. Berlin, 1912. (2)
- Neumayer, Hans. *Eine stammesgeschichtlich bemerkenswerte Artkreuzung.* (Biologia gen., viii.) Illus. 8vo. Vienna & Leipzig, 1932. (8)
- Nidek, Matthaeus Brouërius van. See BROUËRIUS VAN NIDEK, M.
- Niwa, Teizo. *Flowering cherries in Japan observed from landscape view point.* (Zoen Zasshi, iii.) Illus. 8vo. n.p., 1936. (3)
- Northern Nut Growers Association. *Report of the proceedings at the annual meetings, 1910-34.* 25 parts. Illus. 8vo. Ithaca, N.Y., 1912-13; Concord, N.H., 1914-16; Annapolis, Md., [1917]; n.p., [1918-1935]. (2)
- Noulet, Jean Baptiste. *Flore du bassin sous-pyrénéen . . . avec l'indication spéciale des espèces qui se trouvent aux environs de Toulouse.* 8vo. Toulouse, 1837. (2)
- Nova Scotia, Wild flowers of. Col. pls. 8vo. n.p., [18-]. (C)
- Oborsky, O. See NĚMEC, B. *Über das Vorkommen von Gold.*
- O'Brien, Charlotte, & Parkinson, C. *Wild flowers of the Undercliff, Isle of Wight.* Col. pls. 8vo. 1881. (2)

- Ocean flowers and their teachings. Illus. [with dried specimens inserted]. 8vo. Bath, etc., 1846. (C)
- Ogawa, K. Lilies of Japan. Col. pls. fol. Tokyo, etc., [18—]. (2)
- Ono, Motoyoshi. Ed. See INUMA, Y. Somoku-Dusets. 2nd ed.
- Oostroom, Simon Jan van. A monograph of the genus *Evolvulus*. (Meded. Bot. Mus. Utrecht, 14.) 8vo. Utrecht, 1934. (2)
- Ørsted, Anders Sandøe. See LIEBMANN, F. M. Chênes de l'Amérique.
- Ortega, Casimiro Gomez de. See GOMEZ DE ORTEGA, C.
- Ostenfeld, Carl Emil Hansen. On the ecology and distribution of the grass-wrack (*Zostera marina*) in Danish waters. (Rep. Danish Biol. Stat., xvi.) Illus. 4to. Copenhagen, 1908. (2)
- Otto, Friedrich. See LINK, H. F. Icones plantarum.
- Ouvray, E. Manuel d'arboriculture et de viticulture. Illus. 12mo. Vendôme & Paris, [before 1913]. (2)
- Overbeck, Fritz. Mittelgebirgsflora; die charakteristischen Bergpflanzen Deutschlands. Illus. by HERMINE OVERBECK & ERICH NELSON. Col. pls. Illus. 8vo. Munich, [1935]. (2)
- Overbeck, Hermine. Illus. See OVERBECK, F. Mittelgebirgsflora.
- Oxford. Botanic Garden. See STEPHENS, P. Catalogus. 1658.
- Oye, Paul van. De mikrofauna en flora der bladtrechters van Bromeliaceae. (Natuurwet. Tijdsch.) 8vo. n.p., 1923. (2)
- [Paintings of Japanese and other plants.] Col. pls. fol. [n.p., n.d.]. (C)
- Palisot de Beauvois, Ambroise M. F. J., Baron. Flore d'Oware et de Benin, en Afrique. 2 vols. Col. pls. fol. Paris, 1804-07 [actually 1805-20]. (C)
- Pampanini, Renato. La *Yucca australis* Trelease. (Bull. Soc. Tosc. Ort., xxxiii.) Illus. 8vo. Florence, 1908. (2)
- *Agave littaeoides* Pampanini. (Bull. Soc. Tosc. Ort., xxxiv.) Illus. 8vo. Florence, 1909. (2)
- Una nuova *Agave* [*A. littaeoides*]. (Bull. Soc. Bot. Ital.) 8vo. [Florence], 1909. (2)
- *L'Haemanthus filiflorus* Hiern e la sua posizione sistematica. (Nuovo Giorn. Bot. Ital., N.S., xix.) Col. pl. 8vo. [Florence], 1912. (2)
- Le varietà dell' *Erica arborea* L. (Bull. Soc. Bot. Ital.) 8vo. [Florence, 1914]. (2)
- Panckoucke, Mme. E. Illus. See CHAUMETON, F. P. Flore médicale.
- Parkinson, C. See O'BRIEN, C. Wild flowers of the Undercliff.
- Parkinson, Thomas. Flower painting made easy. Col. pls. fol. [17—]. (C)
- Parodi, Lorenzo R. Las plantas indigenas no alimenticias cultivadas en la Argentina. (Rev. Argent. Agron., i.) 8vo. Buenos Aires, 1934. (2)
- Pascher, Adolf A. Übersicht über die Arten der Gattung *Gagea*. (Lotos.) 8vo. [Prague], 1904. (2)
- Conspectus *Gagearum* Asiae. (Bull. Soc. Imp. Natur. Moscou.) 8vo. [Moscow], 1905. (2)
- Neue Arten und Varietäten der Gattung *Gagea*. (Fedde, Rep. Sp. Nov., i.) 8vo. [Leipzig], 1905. (2)
- Tres novae species Asiaticae generis *Gageae*. Novae *Gageae*. *Gageae* generis duae species novae Indicae. Novae *Gageae* ex stirpe *Gagea bohemica* s. ampl. (Fedde, Rep. Sp. Nov., ii.) 8vo. [Berlin], 1906. (2)
- Zur Kenntnis zweier mediterraner Arten der Gattung *Gagea* (*Gagea foliosa* R. Sch., *Gagea peduncularis* Pasch.). (Beih. Bot. Centralbl. xx, Abt. 2.) 8vo. [Dresden, 1906.] (2)
- Ed. Die Süßwasser-flora Mitteleuropas. Heft 15. Pteridophyten und Phanerogamen, unter gleichzeitiger Berücksichtigung der wichtigsten Wasser- und Sumpfpflanzgewächse des ganzen Kontinents von Europa, von H. GLUCK. Illus. 8vo. Jena, 1936. (2)
- Paterson, R. H. Appendix. See HENNEDY, R. Clydesdale flora.

EXTRACTS FROM THE PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

NOTICES TO FELLOWS.

SUBSCRIPTIONS.

All annual subscriptions are payable in advance on January 1 of each year. Fellows can at any time relieve themselves of any further trouble in the matter either by compounding by payment of a lump sum for Life Membership, or by obtaining from the Secretary a Banker's Order, instructing their bankers to pay their subscriptions on January 1 each year.

CHANGE OF ADDRESS.

Fellows are reminded that it would be of material assistance to the Secretary in dispatching their tickets, plant distribution lists, JOURNAL, or any other communications that may have to be addressed to them, if any change of address or change in bankers through whom their subscriptions are paid is notified to him as soon as possible.

PLANT DISTRIBUTION.

Lists of seeds and plants available for distribution in 1938, together with the form of application for them, will be distributed with the January JOURNAL. Should by any chance these lists and forms be mislaid, Fellows should notify the Secretary immediately.

SOME IMPORTANT EVENTS IN 1938.

Annual Meeting : *February 22.*

Daffodil Show : *April 12 and 13.*

Early Market Produce Show : *April 12 and 13.*

Conference on Flowering Trees and Shrubs : *April 26, 27 and 28.*

Chelsea Show : *May 25, 26 and 27.*

CALENDAR.

December 8 and 9, from 2 to 4 P.M.—Practical Demonstration at Wisley (weather permitting) on the pruning of fruit trees.

December 14, 12 noon to 5 P.M.—Fortnightly Meeting and Show of flowers in season.

The Presidential Address of the Institute of Landscape Architects will be given at 3.30 P.M., on *December 14*, in the Lecture Room of the New Hall. Fellows interested are invited to attend.

January 11, 12 noon to 5 P.M.—Fortnightly Meeting and Show of flowers in season.

The lecture in the afternoon at 3.30 in the Lecture Room of the New Hall will be given under the auspices of the Institute of Landscape Architects, when the subject is to be "Landscape Design in Town Gardens" and will be given by Mr. R. SUDELL. Fellows interested in this subject will be welcome at the Lecture.

January 25, 12 noon to 5 P.M.—Fortnightly Meeting and Show of flowers in season.

A lecture on "Mushrooms" will be given in the Lecture Room of the New Hall at 3.30 P.M. by Miss D. M. CAYLEY.

PRACTICAL DEMONSTRATIONS.

A demonstration on the pruning of fruit trees will be given at Wisley on *December 8 and 9 from 2 to 4 P.M.*, weather permitting. Fellows who intend

to be present at this demonstration are asked to inform the Director, R.H.S. Gardens, Wisley, Ripley, Surrey, beforehand, mentioning on which day they will attend, in order that adequate arrangements may be made.

PICTURES, PLANS, PHOTOGRAPHS, ETC.

During the winter space will be available at Fortnightly Shows for pictures and photographs of plants, flowers, gardens and plans or models of gardens. Regulations with regard to these exhibits may be had on application to the Secretary. The dates of the Shows during this winter are *December 14, 1937, January 11 and 25 and February 8 and 22, 1938.*

HORTICULTURAL EXAMINATIONS.

Intending candidates for the Society's 1938 examinations are reminded that the syllabus, giving the dates for next year's examinations and entry forms, may now be obtained from the Society's Offices.

PUBLICATIONS.

Daffodil Year Book.

The Daffodil Year Book for 1937 is now available upon application to the Secretary, the price being 5s. in limp cover, and 6s. in stiff cover.

Lily Year Book.

The Lily Year Book for 1937 may also be obtained upon application to the Secretary, price 5s. in limp cover, and 6s. in stiff cover.

R.H.S. Diary, 1938.

The R.H.S. Diary has now appeared for the twenty-seventh year, and it is pleasing to be able to state that it is the most popular gardener's diary published. The price is 2s. 2d. post free, in Pluviusin with back loop and pencil; 3s. 8d. post free in Morocco leather (not refillable) with pencil; or 5s. 2d. post free in refillable Crocodile Case with card and stamp pockets.

Fellows' attention is particularly drawn to the slip which will be found in the Diary with regard to the dates of the Shows after July. Unfortunately, the Society's Calendar was not completed at the time of going to Press.

Horticultural Colour Chart.

Owing to certain technical difficulties occurring in the publication, it is regretted that there will be some delay before the Colour Chart can be published. It is hoped that it will be available shortly after the close of the year. Applications can still be made for a copy of the work.

WISLEY IN DECEMBER.

In December the variety of flowers to be seen in the outside borders and collections will not be great, but in Seven Acres among the trees and shrubs there will no doubt still be berries on some of the Cotoneasters, Barberries, and Spindle Trees, to mention a few of those notable for the beauty of their fruits. On the sides of the pond and elsewhere the Dogwoods and Willows with their brightly coloured stems are a reminder that beauty is not confined to flowers alone, for on a sunny day these stand out clearly at some distance, like the white trunks of the Birches, and are highly effective when planted *en masse*. An indispensable small tree for the garden is *Prunus subhirtella* var. *autumnalis*, which produces flowers both at this season and again, usually more freely, in March. In the Heath Garden the numerous varieties of the winter-blooming *Erica carnea* produce their richly coloured spikes of blossoms, and if several varieties are planted there is no need to be without flowers for three of the dulllest months of the year.

In the greenhouses, especially the large Temperate House, several attractive shrubs are flowering. Chief of these are the Mimosas (*Acacia* species) with spikes or balls of yellow blossoms; the clear rose-pink, semi-double *Camellia japonica* var. *magnoliaeflora* and other varieties; the bright red *Epacris ardentissima* and other species of the same genus which so much resemble heathers; the South African *Erica canaliculata* with tiny pale pink bells; the scarlet pendent flowers of *Pentstemonium serpens*, and the lovely clear pink *Luculia gratissima*—all excellent plants for a cool greenhouse of moderate size. The Chrysanthemums, sports of the variety 'Favourite,' in the second house should also form a gay display for the dull days, and under the south wall of the Laboratory we may look for the welcome soft lavender blooms of the Algerian *Iris unguicularis*.

GENERAL MEETINGS.

GREAT AUTUMN FLOWER SHOW.

SEPTEMBER 29-OCTOBER 1, 1937. NATIONAL HALL, OLYMPIA.

LIST OF AWARDS.

- The Coronation Cup*, for the best exhibit in the Show.
 To Messrs. Sutton, Reading, for a group of vegetables.
- Accession Cups*, to commemorate the Accession of His Majesty King George VI, Patron of the Society. Four silver-gilt cups were offered for award for outstanding exhibits. They have been awarded to :
 Messrs. Sutton, Reading, for an exhibit of vegetables.
 J. Pierpont Morgan, Esq., LL.D., D.C.L., D.Sc., Watford (Gardener : Mr. F. A. Steward), for an exhibit of stove and greenhouse plants.
 Messrs. Hillier, Winchester, for an exhibit of trees and shrubs.
 Mr. Stuart Ogg, Swanley, for an exhibit of Dahlias.
- The Wigan Cup*, for the best exhibit of Roses.
 To Messrs. Alex. Dickson, Newtownards.
- Gold Medal.*
 To Messrs. Sutton, Reading, for vegetables.
 To Messrs. J. C. Allgrove, Langley, for fruit trees in pots and gathered fruit.
 To Messrs. Alex. Dickson, Newtownards, for Roses.
 To Messrs. Bees, Chester, for a mixed group of herbaceous plants, Gladioli, Chrysanthemums and Dahlias.
 To J. Pierpont Morgan, Esq., LL.D., D.C.L., D.Sc., Watford (Gardener : Mr. F. A. Steward), for stove and greenhouse plants.
 To Messrs. Hillier, Winchester, for trees and shrubs.
 To Messrs. John Waterer, Sons & Crisp, Bagshot, for trees and shrubs.
 To Messrs. Dobbie, Edinburgh, for Dahlias.
 To Mr. Stuart Ogg, Swanley, for Dahlias.
 To Mr. J. B. Riding, Chingford, for Dahlias.
- Silver Cup.*
 To Messrs. Samuel McGredy, Portadown, for Roses.
 To Messrs. L. R. Russell, Windlesham, for economic and other stove and greenhouse plants.
 To Messrs. Blackmore & Langdon, Bath, for Begonias.
 To Mrs. R. B. Morley, Shockerwick, Bath (Gardener : Mr. F. L. Follwell), for stove and greenhouse plants.
 To Messrs. J. Cheal, Crawley, for trees and shrubs.
 To Messrs. L. R. Russell, Windlesham, for Clematis hybrids and trees and shrubs.
 To Messrs. Carter Page, London Wall, E.C. 2, for Dahlias.
- Silver-gilt Flora Medal.*
 To Messrs. Charlesworth, Haywards Heath, for Orchids.
 To Messrs. Sanders, St. Albans, for Orchids.
 To Messrs. W. A. Constable, Southborough, Tunbridge Wells, for Lilies and other bulbous plants.
 To Messrs. C. Engelmann, Saffron Walden, for Carnations.
 To Messrs. R. Wallace, Tunbridge Wells, for a mixed group of trees and shrubs and bulbous and herbaceous plants.
 To Messrs. Maxwell & Beale, Broadstone, for a heath garden.
 To Messrs. Dickson & Robinson, Manchester, for Dahlias.
 To Messrs. Wakeley Bros., Bankside, S.E. 1, for Gladioli.
 To Messrs. Brown & Such, Maidenhead, for Dahlias.
 To Messrs. Daniels Bros., Norwich, for Gladioli.
- Silver-gilt Banksian Medal.*
 To Messrs. Dicksons, Edinburgh, for Roses.
 To Mr. Elisha J. Hicks, Reading, for Roses.
 To Messrs. D. Prior, Colchester, for Roses.
 To Mr. Amos Perry, Enfield, for mixed group of aquatics, bog plants, ferns and herbaceous plants.

CLXXXVIII PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

To Messrs. Aliwood, Haywards Heath, for Perpetual-flowering and Malmaison Carnations.

To Messrs. Carters' Tested Seeds, Raynes Park, S.W. 20, for flowering plants from seeds.

To Messrs. Keith Luxford, Sawbridgeworth, for Chrysanthemums.

To Messrs. John Waterer, Sons & Crisp, Twyford, for a mixed group of herbaceous and bulbous plants.

To Messrs. William Wood, Taplow, for a mixed group of Michaelmas Daisies and Dahlias.

To Lady Yule, St. Albans (Gardener : Mr. H. Rideout), for Gesneria hybrids, Begonias and other greenhouse plants.

To Messrs. John Peed, West Norwood, for stove and greenhouse plants.

To Messrs. The Donard Nursery Co., Newcastle, Co. Down, for shrubs.

To Messrs. The Knaphill Nursery, Woking, for trees and shrubs.

To Messrs. D. Stewart, nr. Wimborne, for shrubs.

To Messrs. G. Jackman, Woking, for Clematis hybrids and other shrubs.

To Mr. W. J. Marchant, Wimborne, for trees and shrubs.

To Messrs. R. H. Bath, Wisbech, for a mixed group of Gladioli and herbaceous plants.

To Messrs. Jarman, Chard, for Dahlias.

To Messrs. Kelway, Langport, for Gladioli.

To Messrs. Ryder, St. Albans, for a mixed group of Dahlias and Chrysanthemums.

To Messrs. J. F. Spencer, Hockley, for Dahlias.

To Mr. J. T. West, Brentwood, for Dahlias.

Silver-gilt Hogg Medal.

To Messrs. Barnham Nurseries, Barnham, for hardy fruit.

To Messrs. Laxton Bros., Bedford, for fruit.

To Messrs. Thomas Rivers, Sawbridgeworth, for fruit trees in pots and gathered fruit.

Silver-gilt Knightian Medal.

To Messrs. Edward Webb, Stourbridge, for vegetables.

Silver Flora Medal.

To Messrs. H. G. Alexander, Tetbury, for Orchids.

To Messrs. Black & Flory, Slough, for Orchids.

To The Stuart Low Co., Enfield, for Orchids.

To Messrs. Frank Cant, Braiswick Rose Gardens, Colchester, for Roses.

To Messrs. Chaplin Bros., Waltham Cross, for Roses.

To Messrs. C. Gregory, Chilwell, Nottingham, for Roses.

To Messrs. Wm. Lowe, Beeston, for Roses.

To Messrs. Hollamby's Nurseries (Groombridge), nr. Tunbridge Wells, for a mixed group of shrubs and herbaceous plants.

To Mr. R. C. Notcutt, Woodbridge, for shrubs.

To Messrs. G. Reuthe, Keston, for shrubs.

To Messrs. H. Hemsley, Crawley, for shrubs.

To Messrs. Robert Veitch, Alphington, for trees and shrubs.

To Messrs. Wm. Treseder, Cardiff, for Dahlias.

To Messrs. The Ashington Nurseries, Ashington, for a mixed group of Perpetual-flowering Carnations and Chrysanthemums.

To Messrs. Barr, Covent Garden, for Michaelmas Daisies and other herbaceous and bulbous plants.

To Mr. Ernest Ladhams, Godalming, for a mixed group of herbaceous plants and shrubs.

To Messrs. M. Prichard, Christchurch, for herbaceous plants.

To Messrs. A. G. Vinten, Balcombe, for Chrysanthemums.

To Mr. W. Wells, jun., Merstham, for a mixed group of Chrysanthemums, Michaelmas Daisies and herbaceous plants.

To Mr. Ernest Ballard, Colwall, for Michaelmas Daisies.

To Mr. James MacDonald, Harpenden, for a lawn garden.

Silver Hogg Medal.

To Messrs. G. Bunyard, Maidstone, for fruit.

To Messrs. J. Cheal, Crawley, for fruit.

To The Studley Horticultural College, Warwickshire, for fruit.

Silver Knightian Medal.

To Messrs. Fogwills, Guildford, for vegetables.

To Messrs. Dobbie, Edinburgh, for Potatos.

To Messrs. Toogood, Southampton, for vegetables.

Silver Lindley Medal.

To Mr. Amos Perry, Enfield, for submerged aquatics and Water Lilies.

Silver Banksian Medal.

To Messrs. Ben. R. Cant, The Old Rose Gardens, Colchester, for Roses.

To Messrs. Dobbie, Edinburgh, for Roses.

To Messrs. R. Tucker, Faringdon, for Roses.

To Messrs. John Waterer, Sons & Crisp, Twyford, for Roses.

To Messrs. Armstrong & Brown, Tunbridge Wells, for Orchids.

To Messrs. John Waterer, Sons & Crisp, Twyford, for rock-garden plants.

To Messrs. Burkwood & Skipwith, Kingston-on-Thames, for shrubs.

To Messrs. Dartington Hall, Totnes, for a mixed group of shrubs, herbaceous and rock-garden plants.

To Messrs. R. Gill, Penryn, for Rhododendrons.

To Messrs. W. G. Haskins, Bournemouth West, for Clematis hybrids and other climbers and shrubs.

To Messrs. Walton Park Nurseries, Walton-on-Thames, for Conifers and shrubs.

To Mr. G. G. Whitelegg, Chislehurst, for Conifers and shrubs.

To Mr. E. Clegg, Dewsbury, for Dahlias.

To Messrs. Dobbie, Edinburgh, for Gladioli.

To The University of Reading, for Dahlias raised at the University.

To Messrs. Allwood Bros., Haywards Heath, for Border Carnations and Pinks.

To Messrs. Bakers, Codsall, for herbaceous plants.

To Messrs. Blackmore & Langdon, Bath, for Delphiniums and other herbaceous plants.

To Messrs. J. Cheal, Crawley, for a mixed group of Dahlias and herbaceous plants.

To Messrs. Greenyer Bros., Worthing, for Chrysanthemums.

To Messrs. Hewitt, Stratford-on-Avon, for a mixed group of Dahlias and herbaceous plants.

To Messrs. H. C. Lawrence, Chatham, for Chrysanthemums.

To Messrs. The Stuart Low Co., Enfield, for Carnations.

To Mr. A. Miles, Bickley, for herbaceous plants.

To Messrs. Wm. Wood, Taplow, for trees and shrubs.

Flora Medal.

To Mr. Henry Drew, Longworth, for Roses.

To Mr. John Mattock, Headington, for Roses.

To Messrs. S. Bide, Farnham, for a mixed group of Conifers, shrubs and Michaelmas Daisies.

To Messrs. Gurteen & Ritson, Three Bridges, for Conifers and shrubs.

To Messrs. The Stuart Low Co., Enfield, for Conifers and shrubs.

To Messrs. John Scott, Merriott, for trees and shrubs.

To Mr. R. Colpoys Wood, West Drayton, for Conifers and shrubs.

To Messrs. Hocker Edge Gardens, Cranbrook, for rock-garden and bulbous plants.

To Messrs. W. E. Th. Ingwersen, East Grinstead, for rock-garden plants.

To Mr. L. Lawrence, Taplow, for Cacti and succulents.

To Messrs. M. Prichard, Christchurch, for rock-garden plants.

To Mr. Sydney Smith, Enfield, for Cacti and succulents.

To Messrs. Godalming Nurseries, Godalming, for Dahlias.

To Messrs. G. Reuthe, Keston, for rock-garden plants.

To Messrs. G. Bunyard, Maidstone, for a mixed group of herbaceous plants and shrubs.

To Mr. F. J. Bell, Whitley Bay, for Pansies and Violas.

To Mr. J. F. Cumming, Wisbech, for herbaceous plants including varieties of *Scabiosa caucasica*.

To Messrs. C. Engelmann, Saffron Walden, for Gerberas.

To Messrs. H. Prins, Wisbech, for Kniphofia hybrids.

To Messrs. Redgrove & Patrick, Sevenoaks, for a mixed group of Dahlias and herbaceous plants.

To Messrs. T. Simmons, Nether Street, N. 3, for Violas.

Banksian Medal.

To Mr. W. E. B. Archer & Daughter, Ashford, for Roses.

To Messrs. Laxton, Bedford, for Roses.

To Mr. E. B. Le Grice, North Walsham, for Roses.

To Messrs. A. Warner, Colchester, for Roses.

To Messrs. Wheatcroft, Nottingham, for Roses.

To Mr. J. Hogger, Felbridge, for Conifers and shrubs.

To Mr. John Klinkert, Richmond, for Topiary in box and bay.

CXC PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

- To Messrs. T. Yano, Granville Place, W. 1, for Japanese dwarf trees.
To Messrs. Alpine Nurseries, West Moors, for rock-garden plants.
To Messrs. Bedford & Page, Trumpington, for rock-garden plants.
To Messrs. Brookside Nurseries Ltd., Headington, for rock-garden plants.
To Messrs. Clark, Dover, for rock-garden plants.
To Mr. Ernest Ladhams, Godalming, for rock-garden plants.
To Messrs. W. T. Neale, Durrington, for succulents.
To Messrs. J. Robinson, Eltham, for rock-garden plants.
To Messrs. W. H. Rogers, Bassett, Southampton, for rock-garden plants.
To Mr. G. E. Welch, Cambridge, for rock-garden plants.
To Messrs. Gibson, Cranleigh, for Dahlias.
To Messrs. G. F. Letts, Hadleigh, for Dahlias.
To Messrs. L. A. Lowe, Crawley Down, for Dahlias.
To Messrs. Neale Bros., Solihull, for Dahlias.
To Messrs. Thomas Carlile, Loddon Nurseries, Reading, for herbaceous plants.
To Messrs. Clark, Dover, for herbaceous plants.
To Messrs. The Gayborder Nurseries, Melbourne, for Michaelmas Daisies and other herbaceous plants.
To Mr. F. Rich, Worcester, for a mixed group of Dahlias and herbaceous plants.
To Messrs. Rich & Cooling, Bath, for a mixed group of herbaceous and bulbous plants.
To Messrs. Storrie, Thyne, Dundee, for herbaceous plants.
To Messrs. William Yandell, Maidenhead, for a mixed group of Chrysanthemums and Violas.
Hogg Medal.
To Messrs. John Waterer, Sons & Crisp, Twyford, for fruit.
Knightian Medal.
To the Irish Free State, Department of Agriculture, Dublin, for Potatoes.
Lindley Medal.
To Mr. A. Hansen, New Barnet, for Sempervivums.

SEPTEMBER 29, 1937.

FRUIT AND VEGETABLE COMMITTEE.—Mr. E. A. BUNYARD, F.L.S., in the Chair, and eighteen other members present.

Exhibits.

Mr. A. Bayley, Orchard Bungalow, Lent Rise, Burnham, Bucks: Apple 'Bayley's Record' and seedling Apples No. 2 and No. 3.

The Director, John Innes Horticultural Institute, Mostyn Road, Merton, S.W. 19: seedling Apples Nos. 363 and 530.

Mr. W. F. Stockham, "Rothesay," Havefield Road, Uxbridge: seedling Apple.

R.H.S. Commercial Fruit Trials, Wisley: Apples 'Lord Lambourne,' 'Gloucester Cross' and 'Patricia.'

FLORAL COMMITTEE A.—Mr. G. W. LEAK, V.M.H., in the Chair, and seventeen other members present.

Awards Recommended:—

Award of Merit.

To *Chrysanthemum* 'Toreador' as a variety for exhibition (votes unanimous), from Messrs. J. & T. Johnson, Tibshelf. See p. 542.

To Rose 'Sam McGredy' (votes 16 for, 1 against), from Messrs. S. McGredy, Portadown. See p. 542.

Selected for trial at Wisley.

Statice latifolia 'Collier's Pink,' from Mr. W. A. Collier, Redbourn.

The following Award was recommended after trial at Wisley.

First-class Certificate.

To Marigold 'Golden Crown,' from Messrs. Watkins & Simpson, London. See p. 542.

Other Exhibits.

Messrs. Buckwell, St. Mary Cray: Chrysanthemums and Michaelmas Daisy 'Lily Hooker.'

Messrs. J. & T. Johnson, Tibshelf: Chrysanthemums.

H. Perrett, Esq., Lewes: unnamed Michaelmas Daisy.

Mr. H. Woolman, Birmingham: Chrysanthemums.

FLORAL COMMITTEE B.—Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and twenty-four other members present.

Awards Recommended :—

Award of Merit.

To *Amaryllis* 'Hathor' as a hardy flowering plant (votes unanimous), from Messrs. Perry, Enfield. See p. 541.

To *Fothergilla monticola* as an ornamental-foliated shrub (votes 18 for), from Mr. W. J. Marchant, Wimborne. See p. 542.

To *Syringa microphylla* as a hardy flowering shrub (votes 16 for, 2 against), from Mr. R. C. Notcutt, Woodbridge. See p. 543.

Other Exhibits.

Capt. H. G. Hawker, Ermington : *Euonymus planipes*, *Rosa Fargesii*.

Messrs. Russell, Windlesham : *Zephyranthes* sp.

Mrs. Freeman Roper, Chard : *Tithonia speciosa*.

Messrs. Slocock, Woking : *Malus* 'Goldsworth Red.'

Messrs. Stewart, Ferndown : *Cupressus macrocarpa lutea*, Stewart's variety.

Mr. C. H. Taudevin, Wirral : *Cupressus macrocarpa compressa* 'C. H. Taudevin.'

The Hon. Mrs. Tennant, Rolvenden : *Berberis Carvelii*.

ORCHID COMMITTEE.—Mr. F. J. HANBURY in the Chair, and seventeen other members present.

Awards Recommended :—

First-class Certificate.

To *Vanda Sanderiana* var. 'Olympia' (votes unanimous), from Messrs. Sanders, St. Albans. See p. 543.

Award of Merit.

To *Sophrolaeliocattleya* × 'Rosamund,' Westonbirt var. (C. × 'Dinah' × S.-l.-c. × 'Magnet') (votes unanimous), from Messrs. H. G. Alexander, Tetbury. See p. 543.

Cultural Commendation.

To Messrs. Sanders, St. Albans, for *Vanda Sanderiana*, with two spikes, bearing 13 and 10 flowers respectively.

JOINT DAHLIA COMMITTEE.—Mr. T. HAY, V.M.H., M.V.O., in the Chair, and eleven other members present.

Selected for trial at Wisley.

From Messrs. Stredwick, St. Leonards-on-Sea : Dahlias 'Elizabeth Arden' (Dec.), 'Marigold' (Small Cactus), 'Rosina' (Small Dec.).

From Mr. A. F. Tofield, Swaythling : 'Fred Winter.'

From Mr. J. T. West, Brentwood : 'Shirley.'

Dahlias were also exhibited by A. J. Cobb, Esq., Reading ; A. Noad, Esq., Exmouth ; Messrs. Spencer, Hockley ; Messrs. Treseder, Cardiff.

JOINT ROCK GARDEN PLANT COMMITTEE.—The Viscountess BYNG OF VIMY in the Chair, and twelve other members present.

Award Recommended :—

Award of Merit.

To *Gentiana* 'Kirlshlma Rindo' as a flowering plant for the rock garden and alpine house (votes 7 for), from Mr. G. H. Berry, Enfield.

Other Exhibits.

R. H. Macaulay, Esq., Argyll : *Gentiana* × *stevenagensis* variety.

Malcolm McLaren, Esq., Burford : *Eriogonum Wrightii subscapulosum*.

Mrs. Milford, Chedworth : *Sutera breviflora*.

Messrs. Perry, Enfield : *Physalis Franchetii nana*.

JOINT PERPETUAL-FLOWERING CARNATION COMMITTEE.—At Olympia.—Mr. D. INGAMILLS in the Chair, and six other members present.

Exhibits.

Perpetual-flowering Carnations 'Mellow Pink' (to be seen again), 'Allwood's Primrose' (to be seen again), 'Puritan' and 'Lady Hudson,' all shown by Messrs. Allwood Bros., Haywards Heath, Sussex.

OCTOBER 12, 1937.

A lecture was given by Mr. E. A. BUNYARD, F.L.S., on "The History and Cultivation of Peaches and Nectarines."

Chairman, Mr. C. G. A. NIX, V.M.H.

SCIENTIFIC COMMITTEE.—Mr. E. A. BOWLES, M.A., F.L.S., F.R.E.S., V.M.H., in the Chair, and seven other members present.

Remusatia vivipara.—Mr. Bowles showed parts of an Aroid which proved to be *Remusatia vivipara*, which bears bulbils in the axils of scale leaves, each provided with a hook by which it can be carried in an animal's feet.

Cotyledon jasminiflora.—Mr. Hanbury exhibited a piece of the little known South African succulent plant which Mr. Cotton identified at Kew as *Cotyledon jasminiflora*.

Milton's Oak.—Mr. E. G. Baker showed pieces of an Oak from Shropshire with very short peduncles and leaves similar to those of *Quercus pedunculata* bearing exceptionally large ovoid acorns. It is locally known as Mitton's Oak.

Potassium iodide and root-knot eelworms.—Mr. G. Fox Wilson reported that treatment of soil with potassium iodide which had been suggested as a check for root-knot eelworms in Tomatos had not reduced infection by this pest. The rate of growth of the tomatos was increased to some extent. The solution was 1 : 4800 of water.

FRUIT AND VEGETABLE COMMITTEE.—Mr. E. A. BUNYARD, F.L.S., in the Chair, and twenty-six other members present.

Awards Recommended:—

Gold Medal.

To Messrs. J. C. Allgrove, Middle Green, Langley, Slough : for collection of Apples, Pears and Plums.

To Messrs. Bunyard, Maidstone, Kent : for collection of Apples and Pears.

Silver-gilt Hogg Medal.

To Messrs. Cheal, Crawley, Sussex : for collection of Apples and Pears.

To Barnham Nurseries, Barnham, Sussex : for collection of Apples and Pears.

To Messrs. Rivers, Sawbridgeworth, Herts. : for collection of Apples and fruit trees in pots.

To Messrs. Laxton, Bedford : for collection of Apples and Pears.

Silver Hogg Medal.

To Messrs. Daniels, Norwich : for collection of Apples and Pears.

Silver Knightan Medal.

To Messrs. Dobbie, Edinburgh : for collection of Potatos.

To Messrs. Ryders, St. Albans, Herts. : for collection of Onions.

Selected for trial at Wisley.

Kale 'Caledonia,' from Messrs. Ryders, St. Albans, Herts.

Other Exhibits.

Mr. H. E. Addy, Appledene Fruit Farm, Eastwood, Southend-on-Sea : Apple 'Sunset.'

Mrs. M. Barnes, 72 Killowin Avenue, Northolt Park, Middlesex : Apple 'Marvel.'

Mr. H. Coppard, 38B Lebanon Road, East Croydon : seedling Apple.

Mrs. E. Gray, 14 St. John's Road, Poole, Dorset : Apple 'Gray's Patricia.'

Mr. T. Neame, The Offices, Faversham, Kent : collection of Apples.

Mr. H. Tydeman, East Malling Research Station, East Malling, Kent : seedling Apple.

R.H.S. Commercial Fruit Trials, Wisley : collection of Apples.

Mr. J. Raine, Bramblewood, Fawkham, Kent : Plum 'Late Prolific.'

Mr. L. P. Roberts, West Hill Lodge, Westcott, Dorking : Apple 'Joseph Walton.'

Mr. F. J. Sage, Ravourcourt Nursery, Rough Common, Canterbury : Apple 'Big Ben.'

Mr. R. Steward, The Gardens, Ware Park, Ware : Apple 'Fairie Queen.'

FLORAL COMMITTEE A.—Mr. G. W. LEAK, V.M.H., in the Chair, and sixteen other members present.

Awards Recommended:—

Silver-gilt Flora Medal.

To Mr. S. Ogg, Swanley, for Dahlias.

Silver-gilt Banksian Medal.

- To Messrs. Carter Page, London, for Dahlias.
- To Mr. J. B. Riding, Chingford, for Dahlias.
- To Messrs. Wood, Taplow, for Michaelmas Daisies.

Silver Flora Medal.

- To Messrs. Brown & Such, Maidenhead, for Dahlias.
- To Messrs. Cheal, Crawley, for Dahlias.
- To Messrs. Dickson, Newtownards, for Roses.
- To Messrs. Dobbie, Edinburgh, for Michaelmas Daisies.
- To Mr. E. Ladhams, Elstead, for herbaceous plants and shrubs.
- To Messrs. Prichard, Christchurch, for herbaceous plants.
- To Messrs. Spencer, Hockley, for Dahlias.
- To Messrs. Vinten, Balcombe, for Chrysanthemums.
- To Messrs. Waterer, Sons & Crisp, Twyford, for Dahlias and Michaelmas Daisies.
- To Mr. J. T. West, Brentwood, for Dahlias.

Silver Banksian Medal.

- To Messrs. Allwood, Haywards Heath, for Carnations.
- To Ashington Nurseries, Ltd., Ashington, for Carnations and Chrysanthemums.
- To Messrs. Daniels, Norwich, for Gladioli.
- To Messrs. Greenyer, Worthing, for Chrysanthemums.
- To Messrs. Hall, Newcastle-on-Tyne, for Chrysanthemums.
- To Messrs. Kelway, Langport, for Gladioli.
- To Mr. A. Miles, Bickley, for Michaelmas Daisies.
- To Messrs. Wells, Merstham, for Chrysanthemums and Michaelmas Daisies.

Flora Medal.

- To Messrs. Engelmann, Saffron Walden, for Carnations.
- To Messrs. Jarman, Chard, for Dahlias.

Banksian Medal.

- To Messrs. Allwood, Haywards Heath, for *Dianthus Allwoodii*.
- To Mr. W. E. B. Archer & Daughter, Sellindge, for Roses.
- To Messrs. Bentall, Havering, for Roses.
- To Messrs. B. R. Cant, Colchester, for Roses.
- To Messrs. Carlile, Twyford, for herbaceous plants.
- To Colesbourne Gardens, Cheltenham, for Nerines, Chrysanthemums, Berberis, etc.
- To Mr. T. Selwyn Hughes, Great Missenden, for Chrysanthemums.
- To Messrs. Redgrove & Patrick, Sevenoaks, for Dahlias and herbaceous plants.
- To Messrs. Ryder, St. Albans, for Dahlias.
- To Mr. W. Yandell, Maidenhead, for Chrysanthemums.

Award of Merit.

To Chrysanthemum 'Edith Lane' as a variety for exhibition (votes 13 for), from Mr. H. Woolman, Birmingham. See p. 541.

To Chrysanthemum 'Bertha Collier' as a variety for exhibition (votes unanimous), from Mr. H. Woolman, Birmingham. See p. 541.

Selected for trial at Wisley.

Michaelmas Daisy 'Kenneth Collier,' from Mr. W. A. Collier, Redbourn.

Other Exhibits.

- Messrs. Clark, Dover : hardy plants.
- Mr. A. Corderoy, Eltham : Aster 'Elizabeth Arden.'
- Messrs. Greenyer, Worthing : Chrysanthemums 'Diana' and 'Noble King.'
- Lady Brodie Henderson, Ware : Michaelmas Daisies.
- The Misses Hopkins, Coulsdon : Michaelmas Daisies.
- Mr. G. Lockwood, Goodmayes : Aster 'Goodmayes Gem.'
- Mr. H. Lowe, Tibshelf : Chrysanthemum 'Snowdrift.'
- Mrs. Moore, Green Street Green : Michaelmas Daisies.
- Mr. W. Spencer, Milford : Aster 'Milford White.'
- Mr. T. Tyson, Crawley : Chrysanthemum 'Gwen Masse' (to be seen again).
- Mr. R. C. Wood, West Drayton : Michaelmas Daisies, etc.

FLORAL COMMITTEE B.—Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and fifteen other members present.

Awards Recommended:—*Silver Flora Medal.*

- To Messrs. Hillier, Winchester, for ornamental foliaged and flowering shrubs.
- To Messrs. Waterer, Bagshot, for ornamental foliaged and flowering shrubs.

CXCIV PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

Silver Banksian Medal.

To Messrs. Cheal, Crawley, for ornamental foliaged and flowering shrubs.

To Messrs. Jackman, Woking, for Clematis and other shrubs.

Flora Medal.

To Mr. J. Hogger, Felbridge, for Conifers and other shrubs.

To Messrs. Maxwell & Beale, Broadstone, for hardy Heaths.

To Messrs. Russell, Windlesham, for Clematis and other shrubs.

To Messrs. Stewart, Ferndown, for flowering and berried shrubs.

Banksian Medal.

To Messrs. Burkwood & Skipwith, Kingston, for flowering and berried shrubs.

To Messrs. Perry, Enfield, for Physalis and other hardy plants.

To Messrs. Southgate, New Malden, for succulents.

To Mr. G. G. Whitelegg, Chislehurst, for Gentians and other rock-garden plants.

Award of Merit.

To *Calceolaria Pavonii* as a tender flowering plant (votes 11 for), from T. Hay, Esq., Hyde Park, London, W. 2. See p. 541.

To *Hibiscus syriacus* 'Woodbridge' as a hardy flowering shrub (votes unanimous), from Mr. R. C. Notcutt, Woodbridge. See p. 542.

Other Exhibits.

Brookside Nurseries, Oxford: berried shrubs and hardy plants.

Messrs. Cheal, Crawley: *Berberis Thunbergii splendens*.

Mr. A. Corderoy, Eltham: rock-garden plants.

Messrs. Hillier, Winchester: *Gaultheria tetramera*.

Mr. W. L. Irvine, Bromborough: *Akebia lobata*.

Messrs. Jackman, Woking: Clematis 'Duchess of Sutherland.'

Mr. R. C. Notcutt, Woodbridge: *Viburnum flavesces*.

Messrs. Perry, Enfield: *Amaryllis Belladonna Baptisii alba*.

L. de Rothschild, Esq., Exbury: *Berberis sp.* K. W. 5936, *Viburnum foetidum*, *Decasnea Fargesii*, *Rhodostachys bicolor*.

Messrs. Scott, Merriott: *Caryopteris incana*, pink form.

Messrs. Waterer, Bagshot: *Euonymus yedoensis*, *Pyracantha* × *Watereri* (*P. Gibbsii* × *P. Rogersiana*).

The Director, R.H.S. Gardens, Wisley: *Rosa nutkana* in fruit.

ORCHID COMMITTEE.—Sir JEREMIAH COLMAN, Bart., in the Chair, and ten other members present.

Awards Recommended:—

Award of Merit.

To *Laeliocattleya* × 'Invicta' var. 'Accession' (*L.-c.* × 'Labiosa' × *L.-c.* × 'Momus') (votes unanimous), from Messrs. Stuart Low, Jarvis Brook. See p. 542.

Cultural Commendation.

To Mr. S. Farnes, Orchid grower to F. J. Hanbury, Esq., East Grinstead, for *Bulbophyllum Medusae*, with 13 flower-spikes.

To Mr. C. H. Rushton, Orchid grower to Sir William Cooke, Bart., Hampstead Norris, Berks, for *Odontoglossum* × 'Olympia' with two spikes and a total of 80 flowers.

JOINT DAHLIA COMMITTEE.—Mr. T. HAY, V.M.H., M.V.O., in the Chair, and ten other members present.

Selected for trial at Wisley.

From Mr. J. F. Barwise, Burnley: Dahlias 'Dyneley,' 'Fortune,' 'Memory' (to be renamed), 'Queen Vera,' 'Towneley Apricot,' 'Towneley Orange,' 'Wreathwhite.'

From Messrs. Burrell, Cambridge: Dahlia 'Clarice' (Small Dec.), 'Neville Johnson' (Charm).

From Messrs. Spencer, Hockley: Dahlia 'Seedling No. 9/36' (to be named).

From Mr. J. T. West, Brentwood: Dahlias 'Orbit,' 'Tip Top,' 'Welcome.'

Dahlias were also submitted by E. J. Barker, Esq., Ipswich; Miss Bodkin, Sydenham; A. J. Cobb, Esq., Reading; W. McLean, Esq., Darlington; F. J. Sage, Esq., Canterbury.

FRUIT AND VEGETABLE SHOW.

CHIEF AWARDS IN THE COMPETITIVE CLASSES FOR FRUIT
AND VEGETABLES.

FRUIT.

- The Gordon-Lennox Challenge Cup*, for the most meritorious display of fruit staged by an amateur in the competitive classes.
To Colonel F. J. B. Wingfield-Digby, D.S.O., Sherborne (gr. Mr. E. Hill).
- The George Monro Memorial Challenge Cup*, for the best exhibit of Grapes staged by an amateur in the competitive classes.
To the Rt. Hon. Lord Hotham, Beverley (gr. Mr. J. S. Coates).
- The Affiliated Societies Challenge Cup*, for the best eighteen dishes of Apples and Pears staged in the Affiliated Societies Class.
To the Limpsfield, Oxted and District Horticultural Society.
- Class 1.*—Collection of nine dishes of ripe dessert fruit.
First Prize, Silver Hogg Medal and £8.
To the Rt. Hon. Lord Swaythling, Southampton (gr. Mr. F. J. Rose).
- Class 2.*—Collection of six dishes of ripe dessert fruit.
First Prize, Silver Hogg Medal and £5.
To His Grace the Duke of Richmond and Gordon, Goodwood (gr. Mr. S. Capon).
- Class 3.*—Collection of eight bunches of Grapes.
First Prize, Silver Hogg Medal and £12.
To the Rt. Hon. Lord Hotham, Beverley (gr. Mr. J. S. Coates).
- Class 4.*—Collection of four bunches of Grapes.
First Prize, Silver Hogg Medal and £5.
To Mrs. C. M. Murray, Sunninghill (gr. Mr. R. Bowering).
- Class 19.*—Collection of twenty-four dishes of hardy fruits.
First Prize, Silver Hogg Medal and £12.
To Colonel F. J. B. Wingfield-Digby, D.S.O., Sherborne (gr. Mr. E. Hill).
- Class 20.*—Collection of twelve dessert varieties of Apples.
First Prize, Fruiterers' Company's Silver-gilt Medal and £5.
To Lieut.-Colonel Sir Randolph Baker, Bt., D.S.O., Blandford (gr. Mr. A. E. Usher).
- Class 21.*—Collection of twelve culinary varieties of Apples.
First Prize, Fruiterers' Company's Silver Medal and £5.
To Lieut.-Colonel Sir Randolph Baker, Bt., D.S.O., Blandford (gr. Mr. A. E. Usher).
- Class 26.*—Collection of twelve dessert varieties of Pears.
First Prize, Silver-gilt Hogg Medal and £5.
To Lieut.-Colonel Sir Randolph Baker, Bt., D.S.O., Blandford (gr. Mr. A. E. Usher).
- Class 93.*—Market Growers. Four British standard half-boxes of 'Cox's Orange Pippin' Apple.
First Prize, Silver Hogg Medal and £4.
To Mr. W. H. Maelor-Jones, West Horsley.
- Class 94.*—Market Growers. Four British standard half-boxes of 'Worcester Pearmain' Apple.
First Prize, Silver Hogg Medal and £4.
To the University of Reading, Horticultural Department.
- Class 95.*—Market Growers. Four British standard half-boxes of any dessert variety of Apple other than 'Cox's Orange Pippin' or 'Worcester Pearmain.'
First Prize, Silver Hogg Medal and £4.
To Messrs. J. Waterer, Sons & Crisp, Ltd., Twyford. (Apple 'Ellison's Orange'.)
- Class 96.*—Market Growers. Four British standard boxes of 'Bramley's Seedling' Apple.
First Prize, Silver Hogg Medal and £4.
To the London County Council Farm, Hollesley.
- Class 97.*—Market Growers. Four British standard boxes of any culinary variety of Apple other than 'Bramley's Seedling.'
First Prize, Silver Hogg Medal and £4.
To the University of Reading, Horticultural Department. (Apple 'Newton Wonder'.)

cxcvi PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

Class 98.—Market Growers. Three one-layer boxes of 'Cox's Orange Pippin' Apple.

First Prize, Hogg Medal and £2.

To Mr. A. T. Hales, Newington.

Class 99.—Market Growers. Three one-layer boxes of any dessert variety of Apple other than 'Cox's Orange Pippin.'

First Prize, Hogg Medal and £2.

To Messrs. J. Waterer, Sons & Crisp, Ltd., Twyford. (Apple 'Ribston Pippin'.)

Class 100.—Market Growers. One one-layer box of a dessert variety of Apple not offered for sale in a printed catalogue or price-list before 1916.

First Prize, Hogg Medal and £1.

To Mr. A. T. Hales, Newington. (Apple 'Laxton's Superb'.)

Class 101.—Market Growers. Three British standard half-boxes of 'Conference' Pears.

First Prize, Silver Hogg Medal and £4.

To Mr. T. Neame, Faversham.

Class 102.—Market Growers. Three one-layer boxes of 'Conference' Pears.

First Prize, Hogg Medal and £2.

To Mr. T. Neame, Faversham.

Class 103.—Market Growers. Three one-layer boxes of 'Doyenné du Comice' Pears.

First Prize, Hogg Medal and £2.

To Mr. T. Neame, Faversham.

Class 104.—Market Growers. Three one-layer boxes of any variety of Pear other than 'Conference' or 'Doyenné du Comice.'

First Prize, Hogg Medal and £2.

To Mr. T. Neame, Faversham. (Pear 'Beurré Hardy'.)

Class 105.—Market Growers. A display of fruit in market packages.

First Prize, Hogg Medal and £2.

To the Lealane Wood Fruit Farm Ltd., Great Braxted.

VEGETABLES.

The R.H.S. Vegetable Challenge Cup, for the highest number of points in the vegetable classes.

To Lieut.-Colonel Sir Randolph Baker, Bt., D.S.O., Blandford (gr. Mr. A. E. Usher).

Class 201.—A table of vegetables.

First Prize, The Riddell Trophy and £16.

To Lieut.-Colonel Sir Randolph Baker, Bt., D.S.O., Blandford (gr. Mr. A. E. Usher).

Class 202.—A collection of twelve kinds of vegetables.

First Prize, The Sutton Cup and £8.

To Mrs. H. L. Hansard, Little Bookham (gr. Mr. J. Wynn).

OCTOBER 26, 1937.

SCIENTIFIC COMMITTEE.—Mr. E. A. BOWLES, M.A., F.L.S., F.R.E.S., V.M.H., in the Chair, and five other members present.

Large acorns.—Mr. F. J. Hanbury showed acorns of approximately twice the normal size from a tree of *Quercus pedunculata* in his garden. The tree annually produced these large acorns.

Dahlia aberration.—A Dahlia sent by Mr. R. S. Williams of Norbury View, Highlands Road, Leatherhead, showed elongation of the internodes of the involucre so that the upper part of the stem appeared to bear spirally arranged bracts about $\frac{1}{4}$ inch long.

FRUIT AND VEGETABLE COMMITTEE.—Mr. E. A. BUNYARD, F.L.S., in the Chair, and eleven other members present.

Exhibits.

Mrs. A. E. Duggins, 17 Filer Road, Sheerness East, Kent: seedling Apple.

Mrs. E. E. Frazer Crichton, Donerybrook House, Douglas, Co. Cork, Ireland: seedling Apple.

Mr. F. Jordan, Yewdene, Edenbridge, Kent: seedling Apples.

R.H.S. Commercial Fruit Trials, Wisley: Apples 'Millicent Barnes,' 'Laxton's Superb,' 'Opalescent,' 'Stonetosh.'

FLORAL COMMITTEE A.—Mr. G. W. LEAK, V.M.H., in the Chair, and sixteen other members present.

Awards Recommended:—

Silver-gilt Banksian Medal.

To Mr. S. Ogg, Swanley, for Dahlias.

Silver Flora Medal.

To Messrs. Cheal, Crawley, for Dahlias.

To Messrs. Daniels, Norwich, for Gladioli.

To Mr. J. B. Riding, Chingford, for Dahlias.

To Messrs. Wood, Taplow, for Michaelmas Daisies and Chrysanthemums.

Silver Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.

To Messrs. Barr, Taplow, for Nerines and Michaelmas Daisies.

To Messrs. Spencer, Hockley, for Dahlias.

To Messrs. Vinten, Balcombe, for Chrysanthemums.

To Messrs. Wells, Merstham, for Korean Chrysanthemums.

Flora Medal.

To Messrs. Engelmann, Saffron Walden, for Carnations.

To Messrs. Lawrence, Chatham, for Chrysanthemums.

To Messrs. Prior, Colchester, for Roses.

Banksian Medal.

To Messrs. Brown & Such, Maidenhead, for Dahlias.

To Messrs. Buckwell, St. Mary Cray, for Chrysanthemums.

To Messrs. Gill, Penryn, for Anemones and Violets.

To Messrs. Low, Enfield, for Carnations.

To Messrs. Carter Page, London, for Dahlias.

Award of Merit.

To Chrysanthemum 'Carisbrooke' as a variety for exhibition (votes 14 for, 2 against), from Mr. J. Maher, Hampton. See p. 541.

To Chrysanthemum 'Gwen Masse' as a variety for cutting and market (votes unanimous), from Mr. T. Tyson, Crawley. See p. 541.

To Chrysanthemum 'Janté Wells' as a variety for the herbaceous border (votes unanimous), from Messrs. Wells, Merstham. See p. 542.

To Chrysanthemum 'Mary Elizabeth' as a variety for exhibition (votes unanimous), from Mr. J. Maher, Hampton. See p. 542.

Other Exhibits.

F. Atkinson, Esq., Pateley Bridge: Dahlia seedling (to be seen again).

Messrs. Clark, Dover: herbaceous plants.

Messrs. D. & F. Dight, Orpington: Chrysanthemum 'Crofton Gold.'

Lady Victoria Gosling, Bishops Stortford: Dahlia seedling.

Misses Hopkins, Coulsdon: herbaceous plants.

Mrs. D. R. Moore, Farnborough: Michaelmas Daisies.

Mr. A. Perry, Enfield: Chrysanthemums.

W. M. Wilcocks, Esq., Surbiton: *Chrysanthemum Parthenium fl. pl.*

Mr. W. Yandell, Maidenhead: Chrysanthemums.

FLORAL COMMITTEE B.—Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and fourteen other members present.

Awards Recommended:—

Gold Medal.

To Lady Beit, Welwyn, for a collection of Codiaeums.

Silver-gilt Banksian Medal.

To Messrs. Cheal, Crawley, for ornamental trees and shrubs.

To Messrs. Hillier, Winchester, for ornamental trees and shrubs.

Silver Flora Medal.

To Messrs. Russell, Windlesham, for greenhouse plants and shrubs.

To Messrs. Waterer, Bagshot, for ornamental trees and shrubs.

Silver Banksian Medal.

To Messrs. Hollamby, Groombridge, for ornamental trees and shrubs.

Flora Medal.

To Messrs. Burkwood & Skipwith, Kingston, for shrubs.

To Mr. E. Ladhams, Elstead, for shrubs.

To Messrs. Russell, Windlesham, for Clematis and other shrubs.

Banksian Medal.

- To Brookside Nurseries, Oxford, for *Berberis* species and seedlings.
- To Mr. J. Klinkert, Richmond, for clipped Box trees.
- To Mr. L. Lawrence, Taplow, for succulents.
- To Messrs. Maxwell & Beale, Broadstone, for Heaths and other shrubs.
- To Messrs. Southgate, New Malden, for succulents.

Award of Merit.

- To *Aphelandra Fascinator* as a flowering plant for the greenhouse (votes 10 for), from Messrs. L. R. Russell, Windlesham. See p. 541.
- To *Berberis vulgaris* var. *asperma* as a hardy ornamental-fruited shrub (votes unanimous), from E. W. Mooring, Esq., Witley. See p. 541.
- To *Saxifraga Fortunei* as a hardy flowering plant (votes unanimous), from the Director, R.H.S. Gardens, Wisley. See p. 542.

Preliminary Commendation.

- To *Ornithogalum Saundersiae* as a flowering plant for the cool house (votes unanimous), from Lionel de Rothschild, Esq., Exbury.

Other Exhibits.

- Mr. A. Corderoy, Eltham : rock-garden plants.
- W. E. Farenden, Esq., Isleworth : *Lonicera quinquelocularis* var. *translucens*.
- Collingwood Ingram, Esq., Benenden : *Viburnum theiferum*.
- Messrs. Russell, Windlesham : *Aristolochia gigantea*, *Fraxinus Excelsior aurea*, *Euonymus europaeus*, weeping variety.
- The Director, R.H.S. Gardens, Wisley : *Berberis* hybrid.
- Mr. R. Colpoys Wood, West Drayton : shrubs.

ORCHID COMMITTEE.—Sir JEREMIAH COLMAN, Bart., in the Chair, and fifteen other members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

- To Messrs. Sanders, St. Albans, for a group.

Silver Flora Medal.

- To Messrs. Charlesworth, Haywards Heath, for a group.

Silver Banksian Medal.

- To Messrs. McBean, Cooksbridge, for a group.
- To Messrs. H. G. Alexander, Tetbury, for a group.
- To Napsbury Hospital, St. Albans, for *Pleione Lagenaria*.

Banksian Medal.

- To Messrs. Stuart Low, Jarvis Brook, for a group.

First-class Certificate.

- To *Vanda coerulea* var. 'Queen Elizabeth' (votes 14 for, 1 against), from Messrs. H. G. Alexander, Tetbury, Glos.

Award of Merit.

- To *Oncidium* × *Mantini* var. *magnificum* (votes 12 for, 3 against), from Messrs. Stuart Low, Jarvis Brook.
- To *Brassocattleya* × 'Marie-Marie' var. 'Perfection' (*B.-c.* × 'Ilene' × *C.* × 'Clotho') (votes 13 for, 2 against), from Messrs. Black & Flory, Slough.

Cultural Commendation.

- To Messrs. Sanders, St. Albans, for *Vanda Lawrenceae*, with 4 many-flowered spikes.

- To Mr. W. J. Jennings, Napsbury Hospital, St. Albans, for an exhibit of *Pleione Lagenaria*, 70 pans with an aggregate of about 700 flowers.

INDEX.

References in italics are to figures and illustrations.

- Abelia floribunda*, 237
grandiflora, 237, clviii
Schumannii, 237, civ, clviii
triflora, 237
Abeliophyllum distichum, **A.M.** 173, lxvii
Aberconway, Lord, on precocious flowering of *Rhododendrons*, 544
Abies alba, 180
Abutilon insignis, 186, clviii, clxxii
megapotamicum, 186, civ, clviii
Milleri, 186
sinense exhb., clxxiv
Acacia, 522
armata, 184
Baileyana, 183
cultriformis, 183
dealbata, 231, xxxvi
diffusa, 184, xxxvi
Drummondii, 183, 184
hastulata, 183, 184
at Kew, 188
Julibrissin, 349
longifolia, 184
mucronata, 183
at Kew, 184
melanoxylon exhb., lxxvi
mucronata exhb., lxxxix
platyptera, 183, 184
prominens, **A.M.** 221, lxxvi
pulchella, 183, 184
retinodes, 184
Acanthus Perringii exhb., cxlix
Acer Campbellii yunnanense, 97
dasycarpum, 386
Davidi, 98, 349
griseum, **A.G.M.** 417, 418
Hookeri, 96
laevigatum, 98
Negundo, 230
californicum aureum, 386
variegatum, 386
nikoense, 351, 418
Opalus, 418
palmatum, 418
platanoides, 386, 418
Schwedleri, 386
Pseudo-platanus Worleei, 386
Achillea clypeolata, 389
Aconitum palmatum, clx
Acorns, germination, xl
large, cxcii, cxvii
Actinidia Kolomikta, 350
"Adam's Profession and its Conquest by Eve," by J. R. Meade, reviewed, 468
Adenandra fragrans, 185
uniflora, 185
Adiantum pedatum, 247
"Adventures with Hardy Bulbs," by Louise Beebe Wilder, reviewed, 467
Advisory Work, vi
Aeonium, 525
Aerides virens Sanderae, cxi
Aesculus parviflora, cxxi
Aethionema oppositifolium exhb., xcvi
Aextoxicum punctatum, 96
Affiliated Societies, 12
Agapanthus africanus, clxxiii
hybrid, clxxiii
inapertus, clxxiii
Agapetes buxifolia, 184
buxifolia exhb., lxxxix
Agathis australis, 447
Ainsworth, G. C., "The Plant Disease of Great Britain: A Bibliography," 421
Alberta magna, 184
Alchemilla hydathodes, 440
Allium canadense, 244
cyaneum, 471
Purdomii, 471
sikkimense, **A.M.** 412, cxlvi
triccoccum, 244
Aloe, 528
bulbicaulis, 227
longistyla exhb., lxxvi
nubigena, 227
variegata, 524, 529
Alpine Plant Conference and Exhibition, iii
Alpines, paved bank for, 380
Alstroemeria haemantha exhb., cxxviii
Ligtu angustifolia exhb., cxxviii
Vivid, **A.M.** 370, cxxviii
Alternaria Brassicae macrospora, 228
Amaryllis Belladonna, **A.G.M.** 451
Baptisia alba, cxci
Hathor, **A.M.** 541, cxci
Amateur's Flower Show, iii
America, South, showing altitudes, 64
American Peony Society, National Show, lxxii
Ammophila arenaria, leaf section, 481
"Among the Meadow and Alpine Flowers of Northern Italy," by J. A. Neame, reviewed, 517
Ampelopsis Hoggii, 453
japonica, 453
Lowii, 453
tricuspidata, 453
Veitchii, 453

CC PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

- Anacampseos*, 529
Anacyclus atlanticus vestitus, xcvi
Anagallis alternifolia exhb., cxlvi
 collina, civ, cxxi
Ananas sativa variegata exhb., cxlix
Anaphalis viscosissima, 472
 "Anatomy of Dessert," by E. A.
 Bunyard, reviewed, 90
Anchusa italica Lansdell's Blue, cxxv
 Westacre exhb., cxliv
 myositidiflora, 391
Androsace brigantiaca, 515
 carinata exhb., xcvi
 cylindrica, cvi
 Halleri, A.M. 267, xcvi
 Laggeri, 515
 sarmentosa exhb., xcvi, cxii
 sempervivoides, 515
Anemone canadensis, 242
 eelworm, 338
 fulgens, 232
 japonica, 349
 nemorosa, 232
 var. exhb., xcvi
 occidentalis, 242, 243
 Pulsatilla, xlviii
 quinquefolia, 242
 ranunculoides, 232
 riparia, 242
 rupicola, 548
 stellata, 232
 sylvestris, 548
 virginiana, 242
Anemonella thalictroides, 242
Anguillulina dipsaci, 341, 346
Angulocaste x Georgius Rex, A.M.
 370, cx
Anisotome antipoda, 447
 latifolia, 499
 Anley, Mrs. Gwendolyn, on *Primula*
 root aphid, 166
 Annual General Meeting, liv
 "Annuals," by Roy Hay, reviewed,
 422
Anomalesia Cunonia, A.M. 267, xciv
Anopterus glandulosa, 185, 231, 236
Ansellia africana, cxi
 nilotica exhb., lxxxix
Anthemis Sancti-Johannis, clx
 tinctoria, 451
 E. C. Buxton, 451
 Kelwayi, 451
 Perry's var., A.G.M. 451
Anthurium Rothschildianum *Nebulae*
 exhb., lxxviii
Anthyllis Hermanniae exhb., cxlvi
Antirrhinum Coral Splendour, cxlix
 Foxwell, cix, cxxiv
 glutinosum, 218, 534
 Ibanjezii, 218
 minus, 180
 rust, 214, 530
 resistant, 214, 534
 spurium, 180
Aotus gracillima, 185
Aphelandra Fascinator, A.M. 541,
 cxcviii
Aphelinus mali, 424
Apium graveolens, *eelworm*, 337
Apple Allington Pippin, xlix
 Amber, 297
 American Mother, xlix
 Arnold's Seedling exhb., xxx
 Arthur Turner, 299, xlix
 Ashmead's Kernel, 297
 Baldwin exhb., lii
 Barnack Orange exhb., xxxix
 Bascombe's Mystery, 296
 Beauty of Bath, 297
 Belvoir Castle, 297
 Beryl, 297
 Big Ben, cxcii
 Boudinica, 296
 Bowden's Seedling exhb., xxx
 Bramley's Seedling, 499, xlix
 Camelot exhb., i
 Cardinal exhb., clxi
 Cellini Pippin, 498
 Charles Baker exhb., xl
 Charles Ross, 83
 Christmas Pearmain, xlix
 Colonel Yate exhb., xxxvii
 Coral, 297
 Court Pendu Plat, *pollination*, xxx
 Cox's Orange Pippin, 84, 86, 298,
 497-9, xlix
 Pomona, xlix
 Crawley Beauty, 299
 pollination, xxx
 Crimson Bramley, xlix
 Curl Tail exhb., xli
 Cutler Grieve, 84
 Diamond, 297
 Dunkin's Seedling exhb., clxxvi
 Early Victoria, 299, xlix
 Ecklinville, 84
 Ellison's Orange, xlix
 Elsie Norman exhb., clxxiii
 Emily Bennetts exhb., lxxxviii
 Epicure, 84, 297, 298, 300, 497,
 500
 Exquisite, 297, 298, 300, 498, 501
 Fairie Queen, cxcii
 Father's Pippin exhb., i
 Garnet, 297
 Gem, 297
 Gloucester Cross, cxc
 Golden Delicious exhb., xli, i
 Spire, 84, xlix
 Gray's Patricia, cxcii
 Grenadier, xlix
 Gresham Redcoat exhb., lxvi
 Gulval Seedling, 278
 High Canons, xlix
 Highgate Pippin exhb., xxx
 Howgate Wonder, 299
 Jade, 297
 James Grieve, 84, 298, xlix
 Jersey Beauty exhb., i
 Jewel, 297
 John Divers exhb., xxxvii
 Short exhb., clxi
 Jonathan, 298
 Joseph Walton, cxcii
 King's Acre Pippin, 499
 King Edward VII, *pollination*, xxx
 Kolatchara, 296
 Lady Suddley, 84, xlix

- Apple Lane's Prince Albert, 84
 Lawfam exhb., xxxvii
 Laxton's Advance, 297
 Early Crimson, 297
 Fortune, 278
 Pearmain, xxx, xlix
 Superb, 298, xlix
 Lord Derby, xlix
 Lambourne, 298, xlix
 Maiden's Blush, 297
 Marvel, cxcii
 Melba, 297, 303
 Millicent Barnes, 298
 Monarch, 299
 Onyx, 297
 Ontario, xlix, cv
 Opal, 297
 Opalescent, cxcv
 Patricia, cxi
 Pearl, 297
 pollination, xxx
 Prince George, 297
 Redcoat Grieve, 298
 Renown, xlix
 Rev. W. Wilks, xlix
 Richmond's Seedling exhb., xxxvii
 Rival, 84, xlix
 Ronald exhb., lxvi
 Royal Jubilee, pollination, xxx
 Ruby, 297
 St. Cecilia, 303
 San Jancinto exhb., clxxiii
 Sowman's Seedling, 296, 299
 Steine Seedling, 297, xl
 Stirling Castle, xlix
 Stonetosh, 258, l
 Sturmer Pippin, xlix
 Sunset, xxxvii, cxcii
 Sussex Pippin, lxvi, cix
 Tetowica, 296
 Thorpe's Peach exhb., lxxviii
 Topaz, 297
 Wanstall Pippin exhb., lii
 Wealthy, 297
 Winter King, 296, 298, xli
 Woolbrook Pippin, 298, 498, 504
 Russet, 299, 499, 504, lxxv, xciii
 Worcester Pearmain, 83, 297, xlix
 Young's Pinello, 297, xxxix
 Apples, an Amateur's Notes, 83
 "Apples of England," by H. V. Taylor,
 reviewed, 89
 Apples, pollination in, clxxiii
 "Aquariums and Fish Ponds," by
 A. L. Wells, reviewed, 178
 Aquilegia canadensis, 243
 ecalcarata, 351
 leptoceras, 243
 truncata, 243
 Arabis, in Pacific North-West, 276
 Arachnanthe Maingayi exhb., cxi
 Araujia sericifera, xxxvii, clxxvii
 Arbutus Menziesii, 247
 Unedo, 385
 Architecture, Garden, International
 Exhb., cxl
 Arctostaphylos Uva-ursi, 247
 Arisaema Dracontium, 242
 triphyllum, 242
 VOL. LXII.
 Argemone hispida, A.M. 412, cxlv
 Aristea cyanea, P.C. clxxvii
 Aristotelia gigantea, cxcviii
 racemosa, 417
 Armeria Bees' Ruby, 390
 boetica, 390
 caespitosa, xlviii
 Armstrong, Prof. H., death of, cxlvii
 Aroid from Siam, lxxviii, lxxxvii
 Aronia arbutifolia, 238
 melanocarpa, 238
 Artemisia Ludoviciana, A.G.M. 508
 gnaphalodes, 508
 Aruncus sylvestris, 244
 Arundinaria anceps, 173
 fastuosa, 173
 Asclepias curassavica, 188
 Ascoidea rubescens, 143
 Asparagus beetle, clx
 fly in Herts, lxv
 Lutzi, 189
 plumosus nanus, 189
 Sprengeri, 189
 Asphodelus acaulis exhb., lxxiv
 luteus liliflorus, 399
 Asplenium calcicola, 472
 Ruta-muraria, 472
 Associates of Honour, ix
 Aster Amellus, 220
 Blue Bird, 391
 Elizabeth Arden, cxci
 Goodmayes Gem, cxci
 hybridus luteus, 519
 Kenneth Collier, cxci
 Lilac Time, 391
 Lily Hooker, cxc
 novae-angliae, 248
 novi-belgii, 248
 Countess of Dudley, 390
 Daphne, 390
 Dorothy Vokes, 390
 Marjorie, 390
 Nancy, 390
 Venus, 390
 Pappei, lxxiii
 ptarmicoides, 519
 sp. (H.M. 641), P.C. cxii
 eelworm, 338
 Thomsonii nana, 391
 Victor, 391
 Asterago lutea, 519
 Asteranthera ovata, P.C. cxxviii
 Astrophytum Asterias, 526
 Asystasia bella, 185, lxxiii
 Atherosperma moschatum, 235
 Aubrietia Coronation exhb., lxxvii
 Glory of the Garden exhb., cviii
 Trevor Rose exhb., cviii
 Audouinia capitata, 185
 Auricula root aphid, 166
 Award of Garden Merit, 134, 416, 450,
 508
 Awards to Plants, 87, 130, 173, 221,
 267, 321, 370, 412, 454, 510, 541
 Azalea gall, cxlviii
 Azaleas at Wisley, 543
 Azara integrifolia, 235, lxviii
 lanceolata, 98, cxlix
 microphylla, 231, 235, 236

- Baker, G. P., on *Hemerocallis*, 399
 Balance Sheet, 1936, xii-xxvi
 Barclay, D., *see* Bolus, H. S. M.
 Barnes, C. A., on *Calypso bulbosa*, 514
 Battleston Hill, iv
 Bats and Flowers, 276
Bauera rubioides, 185
 Beale, P. T. B., on Dutch yellow
 Crocus on wet ground, 326
Beaumontia grandiflora, 545
 Beech disease, 142
Begonia acuminata, 186
 Bella, **A.M.** 454, clxi
 boliviensis, 186
 coccinea, 186
 Davisii, 186
 Dregel, 186
 Evansiana, 186
 Florence Bush exhb., cix
 fuchsoides, 186
 glaucophylla, 189
 Gloire de Lorraine, 186, 189
 gracilis, 186
 Hoogeana, 186
 Ingramii, 186
 John Langdon, **A.M.** 454, clxi
 Lynchiana, 186
 manicata, 186
 Mrs. J. Layton exhb., clx
 nitida, lxxv
 N. M. Agnew, **A.M.** 454, clxi
 Pearcei, 186
 pendula Scarlet Glow, **A.M.** 370, cxxiv
 Rose Edney exhb., clx
 R. R. Anderson, **A.M.** 321, cix
 semperflorens, 186
 socotrana, 186
 Sutherlandii, 186
 weltoniensis, 186
 Bell, J. W., "Nature's Remedies," 178
Beloperone guttata, 186
 Bequest to Society, xlvii
Berberidopsis corallina, 252
Berberis Aquifolium, 386
 aristata, 509
 Bealii, 235
 Chitria, **A.G.M.** 508
 congestiflora hakeoides exhb., xcv
 Darwinii, 229
 stomata, 482
 Jamesiana, clviii
 polyantha, 387
 Sargentiana, 386
 sp. K.W. 5936, clxxvii
 x stenophylla, xlviii
 Thunbergii, 386
 atropurpurea, 386
 splendens, cxciv
 vulgaris asperma, **A.M.** 541, cxcviii
 stomata, 482
 Wallichiana microcarpa, **P.O.** lxxvi
 Wilsonae, 387
 verruculosa, 387
 yunnanensis, clviii
 Berry, The Boysen, 297
 Besant, J. W., on *Gesneriaceae*, hardy and half-hardy, 249
 Beta vulgaris, eelworm, 337
Betula, 385
 glandulosa rotundifolia, 247
Billbergia Saundersii exhb., xxxi
Blackberry Bedford Giant, 302
 Clandon Seedling, 302
 Himalaya Giant, 302
 John Innes, 302, clxxiii
 Merton Thornless exhb., clxxvii
 Young Berry, 302
 Bodnant, Gardens at, cxix, cxi
 Bois, D., "Les Plantes Alimentaires," 469
 Bolus, H. S. M., Barclay, D., and Steer, E. J., "A Second Book of South African Flowers," 225
 Book reviews, 89, 136, 176, 225, 272, 328, 375, 421, 465, 517, 546
 Books added to Library, cxxx, clii, clxiii, clxxviii
Boronia elatior, 184
 fastigiata, 188
 heterophylla, 184
 megastigma, 184, 447
 "Botany Catechisms," reviewed, 421
Bougainvillea Mrs. Butt, 184
 Orange King exhb., lxxvi, cvii
Brachyglottis repanda, 545
 repanda purpurea, 447
Brassica chinensis, 228
 oleracea acephala, eelworm, 338
Brassocattleya x Ilene, cxcviii
 x Marie-Marie, *Perfection*, **A.M.**, cxcviii
 x Windsor, **A.M.** 370, cxxviii
Brassolaeliocattleya x Elecktron exhb., clxxv
Bravo geminiflora, 187
Briggsia Agnesiae, 251
 amabilis, 251
 taliensis, 251
 "British Trees and Shrubs," by H. Gilbert-Carter, reviewed, 90
Bromeliad, xxx
Browallia elata, 188
 speciosa major, 188
 viscosa, 188
 Brown, E., on interesting plants in Wisley greenhouses, 515, 545
Brownea x Crawfordii, **F.C.C.** 130, xli
Bruchus dorsalis, lxvi
Brunfelsia calycina, 185
 calycina macrantha, 185
Buddleia alternifolia, 237, 349, 387
 asiatica, 185, 189
 auriculata, 237
 Colvillei, 237
 Davidi, 237, 350, 387
 Fallowiana alba, 237
 globosa, 237, 387
 hastata exhb., cvii
 Lindleyana, 237
 officinalis, 185
 Weyeriana var. exhb., clxxiv
Bulbine mesembryanthemoides, 528
Bulbinella caudata exhb., lxxvi
 Rossii, 447
Bulbophyllum Medusae, cxciv
 orthoglossum, 139

- Bunyard, E. A., on The York and Lancaster Rose, 420
 "Old Roses," "The Anatomy of Dessert," 90
 on Tree Heath, *Erica arborea*, 326
see Hadfield, Miles
Burchellia capensis, 184
 Buttercup, conducting tissue, 481
 nectary, 437
 Byng of Vimy, Viscountess, on *Calypso borealis*, 514
 on Some Canadian Wildings, 239
- Cabbage eelworm, 338
 Cacti, 523
 and Succulents, Silver Trophy, 521, cxix, cxxxix
Calceolaria alba, civ
Darwinii, cxxvii
integrifolia, 237
Pavonii, *A.M.* 541, cxxi, cxciv
picta, *A.M.* 321, cvi
violacea, xlviii, lxxiii
Callistemon lanceolatus × *acuminatus* exhb., cxxviii
linearis, 236
speciosus, 236
Caltha palustris, 242, 247, 439
epidermis, 436
Calypso borealis, 514
bulbosa, 245, 514
Camassia Quamash, 472
Camellia Bohea, 355
 Bush Hill Beauty exhb., liii
cuspidata, 232, 352, 354, 356
euroides, 352, 357
Forrestii, 363
grandiflora, 183
hongkongensis, 352-4, 355, 358, 359
japonica, 234, 352-5, 358-60, 369, xxxvi, xlviii
 Lady Clare, 183
 Kimberley, 183
magnoliaeflora, 183
maliflora, 183, 352, 354, 357
oleifera, 232, 234, 352, 361, 362
Pitardii, 363-5, 367-9
reticulata, 232, 352, 354-5, 362-5, 367, 369
rosiflora, 352, 357, 358
flore pleno, 352, 357
saluenensis, 352, 354, 355, 363-9
Sasanqua, 232, 234, 352-5, 357, 360-2
 cuttings, treatment, 139
flore pleno, 361
sinensis, 354-6
 species in cultivation, 352
speciosa, 362-5
Thea, 355
assamica, 232, 234
theifera, 355
Campanula Allionii Silver Bells, *P.C.* cxii
arvatica alba, *A.M.* 412, cxlvii
betulaefolia, *A.M.* 321, cxii
carpatica Abundance, 391
alba, 392
Campanula carpatica Riverslea, 391
 Slaugham White, *A.M.* 412, cxlviii
 White Star, 392
 Clarence Elliott, *A.M.* 412, cxlvi
Herminii exhb., cxii
incurva, *A.M.* 412, cxlix
isophylla, 189
alba, 189
 Mayi, 412
Kemulariae, 471
lactiflora, civ
alba, civ
latiloba, Six Hills var. exhb., cxxviii
Leutweinii, 413
longestyla, cxlix, clix
malacitana exhb., cxlvi
Medium virescent, cxliv
 new, from Transcaucasia, 471
persicifolia, Pride of Exmouth, 391
pilosa dasyantha, *P.C.* cxii
pusilla, 383
lilacina, 412
Raddeana, 471
 × *rotarvatica* exhb., cxlvi
rupicola, Giuseppe's var., *A.M.* 321, cxii
sibirica, clix
Campsis chinensis, 236
radicans, 236, clxxiv
 Canadian wildings, 239
Capsella Bursa-pastoris, eelworm, 337
Caragana arborescens, cxliv
Caralluma, 527
Dalzielii, 140
lutea, 139
Mouretii, 140
retrospiciens, 140
tombuctuensis, 140
Vansonii, 139
Carduncellus pyreneus, *P.C.* cxxvi
Carica candamarcensis, 516
 Papaya, 516
Carlina acanthifolia exhb., clx
acaulis caulescens exhb., cl
Carmichaelia angustata, 417
Enysii exhb., cxxvii
grandiflora, 417
odorata, 417, 548
Carnation Aida (p) exhb., xxxii
 Alice Forbes (b), *A.M.* 461
 Allwood's Primrose (p), xxxviii, cxci
 anther sweat of, 227
 Audrey Wills (p) exhb., xxxix
 Blue Horizon (b) exhb., cxlvii
 Bonanza (p) exhb., xxxix
 Bookham Lass (b), **A.M.* 461
 Celia (p), *A.M.* 321, xxxix, cv
 Cherry (p) exhb., cv
 Chocolate Pelargonium (p), xxxviii
 Columbine (b), *A.M.* 461
 Coronation Scarlet (b), *P.C.* cxlvii
 Cottage Gem (b), cl
 Maid (b) exhb., cl
 Warrior (b), cl
 Wonder (b), cl
 Countess of Lonsdale (b), **A.M.* 459
 Darkee (b), cxlvii

Carnation Dream (b), cxlvii
 Duchess of Kent (b), cxlvi, cxlvii
 Duke of Windsor (b) exhb., cxlvii
 Ebor (b), *A.M. 460
 Edenside Clove (b), *A.M. 461
 Ena Elliott (b), cxlvii
 Firetail Clove (b), P.C. cxlvi, cxlvii
 Flesh Pink Betty Lou (p), xxxviii
 Florence Turner (b) exhb., cxlvii
 Frances Kinnaird (b), cl
 Freda (p) exhb., cv
 F. W. Hill (b) exhb., cxlvii
 Galaxy (b), *A.M. 461
 G. D. Murray (b), cxlvii
 Glen Glory (b), *A.M. 461
 Golden Marvel (b), cxlvi
 Gordon Douglas (b), A.M. 459
 Greatheart (p) exhb., xxxii, cv
 Grenadier (b), *A.M. 458
 Hadrian (b), *A.M. 463
 Harmony (b), F.C.C. 412, cxlix
 Harriet Harrow (b), cl
 Jasper Clutterbuck (p), xxxix, cv
 Lady Hudson (p), xxxviii, cv, cxii
 Limpsfield Fancy (b), A.M. 462
 Scarlet (b), cxlvi
 White (b), P.C. cxlix, cl
 Lindy Lou (p) exhb., xxxii
 Magelii (p) exhb., xxxix
 Maisie Thorburn (b), P.C. cxlvii
 Marchioness of Headfort (p), xxxii
 Margaret Day (b), cxlvii
 Margaret of Stokesay (p), xxxix
 Mellow Pink (p), cxc
 Merlin Clove (b), *A.M. 462
 Mrs. Edmund Charrington (b), *A.M. 462
 Mrs. Thorburn (b), cxlvi
 Peter Fisher exhb., xxxii
 Puritan (p), cxc
 Quaker Maid (b) exhb., cxlvii
 Raymond Howe (b), *A.M. 460
 Red Rover (b), cxlvii
 R. J. Day (b), cxlvii
 Royal Apricot (p) exhb., xxxviii
 Ruth Sparey (b) exhb., cxlvii
 Scarlet Pelargonium (p) exhb. cv
 Silver Star (b), cxlvi
 Sincerity (b) exhb., cxlvi, cl
 Singwell Clove (b) exhb., cxlvii
 Speckles (b) exhb., cxlvii
 Spectrum strains, 494
 Steerforth Clove (b), *A.M. 462
 Sunbeam (b), cxlvi
 Sunray (p) exhb., cv
 Sussex Beauty (pb), cxlvii
 Gem (pb), cxlvi
 Glory (pb) exhb., cl
 Haze (pb), cxlvi
 Hawk (pb), cxlvi
 Maroon (b) exhb., cxlvi
 Red (pb), cl
 Salmon (pb) exhb., cl
 Scarlet (pb), cxlvii
 Surprise (pb), exhb., cl
 White (pb), cl
 Suzette (b), cxlvii
 Talisman (b), cxlvi
 Thora Cox (b) exhb., cxlvii

Carnation Vanity (b), P.C. cxlvi, cxlvii
 Virginia (p) exhb., xxxii
 Woolton Clove (b) exhb., cxlvii
 Carnations tried at Wisley, border, 456
 Carpanthea capsules, 428
 Carpenteria californica, A.G.M. 452
 Carpinus Turczaninowii, 349
 Carrots Root-knot Eelworm, 337
 Carter, H. Gilbert-, "British Trees and Shrubs," 90
 Caryopteris × clandonensis, cxxi
 incana, pink form, cxciv
 Mastacanthus, 387
 mongolica, 349
 tangutica, 351
 Cassinia leptophylla exhb., clxii
 Cassiope lycopodioides, A.M. 267, xlviii, xcvi, xcvi
 Mertensiana, 243
 Stelleriana, A.M. 267, xcvi
 Castilleja coccinea, 246
 Casuarina, 522
 Catalpa bignonioides, 384
 Duclouxii, 139
 Fargesii, 139
 Duclouxii, 139
 Cattleya × Clotho, cxcviii
 × Dinah, 542
 × Porcea, A.M. 87, xxxi, xxxii
 Celastrus angulatus, cxliii, cxlv
 Celery Root-knot Eelworm, 340
 Celmisia coriacea Monroi, 230
 Celsia Arcturus, 188
 cretica, 188
 Centaurea Cyanus, 511
 hypoleuca, P.C., cxxv
 Centranthus longiflorus exhb., cxxviii
 Centropogon Lucyanus, 186
 Ceratostigma plumbaginoides, 391
 Cercidiphyllum japonicum, 238
 Cercis racemosa, 351
 Cereus, 526
 Ceropegia, 527
 dichotoma, 528
 Haygarthii, 528
 Sandersonii, 528
 stapeliiformis, 528
 Woodii, 189, 523
 Cestichis plicata, 472
 Cestrum elegans, 184
 Newellii, 184
 Parqui exhb., clxxiv
 sp. in Guatemala, 276
 Chamberlain, J. E., on Leather-Jackets on Lawns, 419
 Chasmanthe caffra, 519
 Chelone glabra, 244, 248
 Chemical analysis privileges, 16
 Chenery, E. M., on problem of the blue Hydrangea, 304
 Cherry Anadolskaya, 296
 Koslorskaia, 296
 Lotovaya, 296
 Luibskaya, 296
 Nikitskaya Chornaya, 296
 North Caity, 296
 Ochrida, 296

Cherry Odesskaya Chornaya, 296

Postovatskaia, 296

Shubinca, 296

Sphanka, 296

Vasievka, 296

Vladimir, 296

Vladimiskaya, 296

Zolotaya, 296

Chimaphila maculata, 241

umbellata, 241

Chimonanthus fragrans, 349**China, flora of, 347, 548****Chironia linoides, 186****Chittenden, F. J., on Award of Garden**

Merit, 134, 416, 450, 508

Chlora perfoliata, effect of lime, 476**Chlorita flavescens, 211**

viridula, 211

Choananthus cyrtanthiflorus, clxxiii,

clxxiv

Wollastonii, clxxiii

Chorizema ilicifolium, 183, 447**Chrysanthemum American Beauty, 129**

Apollo, 220

Aresco Single exhb., xxxviii

Bertha Collier, A.M. 541, cxci

Bronze Favourite exhb., xl

Caledonia exhb., clxxiv

carinatum, 188

Carisbrooke, A.M. 541, cxcvii

Caroline, 129

Catananche, A.M. 321, cviii

Ceres, 220

Clara Trueman, 128

coccineum, eelworm, 337

Coralie, 128

coreanum, 220

coronarium Golden Crown, A.M. 510,

clxxvi

Crofton Gold, A.M. 87, xxxviii

Dante, 128

Daphne, 220

Diana, 220, cxci

Edith Alston, 128

Lane, A.M. 541, cxci

Edward Page, 541-2

eelworm, 338

Fifi, 128

Friendly Rival, 129

Gaiety, exhb. clxxiv

George Prickett, xxxix

Gertrude Smith exhb., xxxviii

Gwen Masse, A.M. 541, cxci, cxcvii

Hardwick Pink, exhb., xl

Henry E. Trueman, 128

Henry Woolman, 128

Hugh Mitchell, 128

Ida Scott exhb., xl

Ideal, 129

indicum, 220

Jane Ingamels, 129

Janté Wells, A.M. 542, cxcvii

Jean Batten, 129

Brydie, A.M. 173, xxxi

John Wycliffe, 129

Kimberley Crimson, 129

Lydia, 128

Mars, 220

Mary Chamen exhb., xxxi

Chrysanthemum Mary Elizabeth,

542, cxcvii

maximum, 413, cxliv

Aigrette exhb., clx

Esther Read, 391

Horace Read, A.M. 413, cxliv

May Wallace, 129

Mercury, 220, clxxvii

Mrs. Nellie Walker exhb., xxxviii

Noble King, cxci

Nyron, A.M. 510, clxxiv

Old Rose Favourite exhb., xl

Parthenium fl. pl., cxcviii

Pink Distinction, 129

Priscilla exhb., xxxi

Prosperity, 128

Red Dome, A.M. 173, xxxi

Rivelin, 129

Rose Précoce, 541

segetum, 188

September Glory, 541

Sir Austen Chamberlain, 128

Snowdrift, cxci

The Ace, 128

Toreador, A.M. 542, cxc

uliginosum, 440

Windsor Gold, 128

Winter Glory, xl

Yellow American Beauty, A.M. 87,

xxxix

Chrysanthemums, Korean, 213, 220

notes on new, 128

Chrystal, R. Neil, "Insects of the

British Woodlands," 466

Chuno, 68**Churcher, Major G., on the modern**

Gladiolus, 489

Cineraria Beauty of Cambridge, cix

stellata, xciv

Cirsium Velenovskiy exhb., cxlv**Cissus Juttae, 529**

quadrangularis, 529

Cistus algarvense, 387

ladaniferus, 387

Loretii, 387

purpureus, 387

Citrus Bizarria, xciii

trifoliata, 229

Cladrastis sinensis, 98**Clarke, H., "Rural Roundabout," 90****Clay, Sampson, "The Present Day**

Rock Garden," 465

Claytonia virginica, 241**Clematis alpina Columbine, cvii**

rosea, cvii

Armandii, 349, xcv

x Boweri, 179

cirrhosa, 236

Davidiana, 179

Duchess of Sutherland, cxciv

Fargesii, 350

integrifolia, eelworm, 337

Jackmanii, 447

Jouiniana, 236

Spingarn's var. exhb., clxxvii

Lasurstern, cxxv

macropetala Markhamii, lxxix

Ruby, cvii

macrosepala, 349

- Clematis marata*, 94
Meyeniana, 348
montana rubens, 81, 447
occidentalis, 244
paniculata, 515
sibirica alba exhb., cx
Silver Queen, cxxv
stans, eelworm, 337
verticillata columbiana exhb., cx
virginiana, 179
Vitalba, eelworm, 337-8
Viticella, Grey Lady, clx
Moat Star, clx
Stella, clx
Stolen Kiss, clx
Clerodendron fallax, 186, 188
foetidum, eelworm, 337
trichotomum exhb., xxxi
ugandense, 186
Clethra alnifolia, 236
arborea, 95
canescens, 236
Delavayi, 350
Clianthus Dampieri, 185, 189
puniceus, 185
Clintonia borealis, 245
Codonopsis clematidea, civ
Coburgia Belladonna, 451
Coelogyne Dayana, cxxvi
Colchicum triphyllum, *A.M.* 173, liii
Coleonema album, 185
Coleus barbatus, 186
Blumei, 186
thyrsoides, 186
Colletia aciculata, 519
armata, 519
spinosa, 519
spinosissima, 519
subglabra, 519
Collinsia bicolor, 188
Collomia linearis, 520
Colocasia antiquorum, lxxxvii
Colonema album exhb., liii
Columnnea Banksii, 189, xlviii, lxviii
Colutea arborescens, 185, 387
Comber, James, on *Lilium Brownii*
colchesteri, 81
Comber, N. M., "Scientific Study of
the Soil," 136
"Commercial Flower Production,"
Bull. Ministry of Agriculture,
reviewed, 467
Committee, *Carnation*, Joint Border
and *Picotee*, 47, cxlvi, cxlix, cl
Joint Perpetual Flowering, 48,
xxxii, xxxviii, cv, clxii, cxc
Dahlia, Joint, 48, clx, clxii, clxxv,
clxxvii, cxc
Delphinium, Joint, 49, cxxix, cxliii,
cxlvi
Exhibition, 53
Floral A., 42, xxxi, xxxviii, xxxix,
xli, l, lii, lxvi, lxxv, lxxviii,
lxxxviii, xciii, cv, cix, cxxiv,
cxxvii, cxliv, cxlviii, clx, clxi,
clxxiii, clxxvi, cxc, cxcii, cxcvii
Floral B., 44, xxxi, xxxviii, xl, xli,
l, lii, lxvii, lxxv, lxxix, lxxxviii,
xciv, cvi, cix, cxxv, cxxviii, cxlv,
cxlix, clx, clxii, clxxiv, clxxvii,
cxc, cxcii, cxcviii
Committees, *Fruit and Vegetable*, 41,
xxx, xxxvii, xxxix, xl, xlix, lii,
lxvi, lxxv, lxxviii, lxxxviii, xcii,
xciii, cv, cix, cxxiii, cxxvii, cxliv,
cxlviii, clx, clxi, clxxiii, clxxvi,
cxi, cxcii, cxcvii
Iris, Joint, 50, xcvi, cviii, cix, cxxix
Library, 55
Lily, 55
Narcissus and Tulip, 46, liii, lxxiv,
lxxvii, lxxx, lxxxix, xcii, xcv,
cix, cvii
Orchid, 45, xxxi, xxxviii, xl, xlii,
li, liii, lxviii, lxxvi, lxxix, lxxxix,
xcv, cvii, cx, cxxvi, cxxviii, cxlv,
cxlix, clx, clxii, clxxv, clxxvii,
cxc, cxcviii
Publications, 55
Rhododendron, Joint, 51, lxxvii,
lxxxvii, xc, xcvi, cv, cviii, cix,
cxi, cxxvi, cxliii
Rock Garden Plant, Joint, 51, li,
liii, lxxiv, lxxvii, lxxxvii, xc, xcvi,
cviii, cxii, cxxvi, cxxix, cxlvi, cl,
clxxv
Scientific, 40, xxx, xxxvii, xxxix, xl,
xlix, li, lxv, lxxiv, lxxviii, lxxxvii,
xciii, cv, cxxii, cxxvii, cxliii, cxlvii,
clix, clx, clxxiii, clxxvi, cxcii, cxcv
Sweet Pea, Joint, 52
Wisley Advisory, 54
Competitions, *Sewell Medal*, xlvii, lxxi,
lxxxii, cxxxix
Competitive Classes for Amateurs,
lxxxiii
Conandron leucanthum, 251
ramondioides, 251, lxxxv, civ
Conferences, iii, xxxvi, cxvii, cliii
Conophytum exertum, 527
Convallaria eelworm, 338
Coprosma rugosa exhb., xxxviii
Coptis quinquefolia, *A.M.* 173, liii
"Cordon Culture of Apples," by H.
Patience, reviewed, 465
Cordyline indivisa vera, 95
Coreopsis basalis, 180
Brentwood Glory, cxliv
diversifolia, 180
Drummondii, 180
grandiflora longipes, 180
Jacksonii, 180
lanceolata, 179
longipes, 180
oblonga, 180
ochracea, 180
tinctoria, 179
Woytkowskii, 180
Cornflower Double Blue Extra Select,
**A.M.* 512
Pinkie, **A.M.* 511
Cornflowers tried at *Wisley*, 511
Cornus alba sibirica, clxxii
Amomum, clxxii
Baileyi, clxxii
canadensis, *A.M.* 245, 413, cxlvi
capitata, 234
florida rubra, 98, 234

- Cornus Kousa*, 234, 237, 238, cx
chinensis, 234, 237
Mas, 233, 385
Nuttallii, 247
officinalis, 233
stolonifera flaviramea, clxxii
Corokia Cotoneaster exhb., cx
macrocarpa exhb., cxxv
Correa alba, 185
cardinalis, 185
Harrisii, 185
magnifica, 185
pulchella, 185
ventricosa, 185
Cortusa altaica, 471
Brotheri, 471
himalaica, 471
jacutica, 471
Matthioli, 471
mongolica, 471
pekinensis, 471
sachalinensis, 471
sibirica, 471
turkestanica, 471
Corydalis thalictrifolia, 184
tomentella, **A.M.** 321, cviii
verticillaris, 471
Corylopsis pauciflora, 235
platypetala, 98
Veitchiana, 235
Corylus Colurna, 519
Cotoneaster congesta, 387
Cooperi microcarpa, 548
Dammeri, 387
frigida, 385
horizontalis, 447
salicifolia, 387
Cotyledon, 528
jasminiflora, cxcii
Pestalozzæ exhb., cxlvi
spinosa, 525
 Council, report of, i
 "Country Life Cookery Book," by
 A. Heath, reviewed, 421
 Coutts, J., on Cool Greenhouse Plants,
 181
Covillea tridentata, 522
 Cowley, H., "The Garden Year," 272
Crassula, 528
columnaris, 528, xli
curta exhb., cxii
mesembryanthemopsis, 528
Crataegus Crus-galli, 385
Paul's Double Scarlet, 385
prunifolia, 385
punctata, 385
 Creosote bush, *see* *Covillea tridentata*
Crepis incana, **A.M.** 413, cxlvi
Crinodendron Hookeri, 230
Crinum Laurentii, **P.O.** xli, lxxvii
Crioceris lilii, clx
Crocus biflorus Alexandri exhb., lxxvii
chrysanthus Zwanenberg Bronze
 exhb., li
corm, Pupa in, clx
 Dutch yellow, in wet ground, 326
minimus Dykes' var. exhb., liii
Sieberi albus, **A.M.** 130, xlix, l
versicolor exhb., li
Crocus veluchensis exhb., li
vernus, lxxviii
 x *Tomasinianus* exhb., lxxvii
 "Crop Production in Frames," Bull.
 Ministry of Agriculture, 518
Crocea angustifolia, 185
saligna, 185
Cryptococcus fagi, 142
Cryptomeria japonica, 349
 "Culture of the Chrysanthemum," by
 Keith Luxford, reviewed, 177
 Cummings, Julia H., "Flower Garden
 Primer or Gardening without Tears,"
 178
 Cup, Accession, clxxxvii
 Clay, for Roses, lxxxiv, cii
 Coronation, clxxxvii
 Foremarke, for Gladioli, ciii, cxix,
 clx
 Jones-Bateman, 32, clvi
 R.H.S., in America, lxxi
 Wigan, clxxxvii
 Cups for Award, 30-2, 325
Cupressus macrocarpa, 384
 Currant, black, Baldwin, 302
Black Tony, 303
Blacksmith, 302
Boskoop Giant, 302
Climax, 302
Coulter's Mains, 302
Davison's Eight, 303
Goliath, 302
Orr's Seedling, 302
Invincible Giant Prolific, 302
Rosenthal's Black, 302
Sunrise, 302
Victoria, 302
Wallace's Seedling, 303
 red, Earliest of Fourlands, 302, 303
Halle's Long Bunch, 302
Laxton's No. 1, 302, 303
Pink Perfection, cxlviii
Rivers' Late Red, 302
Wilson's Long Bunch, 302-3
Cuthbertia graminea exhb., cxlvi
 Cuttings, accelerated rooting of, clx
 effect of callus-paring upon root
 production, 139
Cyananthus Delavayi, 350
lobatus, civ
Wardii, civ
Cyclamen Adeline exhb., lxxv
balearicum, 231
ibericum, **A.M.** 173, lxxiv
neapolitanum album, **A.M.** 510,
 clxxv
persicum exhb., lxxviii
Cydonia cardinalis, 235
japonica, xlviii
Knap Hill Scarlet, 235
Maulei, 235
Cymbidium x *Adastræ*, **A.M.** 267,
 lxxxix, xc
Balkis exhb., lxxxix
 x *Bodmin Moor, Golden Glory*,
F.C.C. 221, lxxvi
 x *Bullfinch*, **A.M.** 370, cxi
 x *Carisbrook, Brilliance*, **F.C.C.** 173,
 lxxviii

Cymbidium × *Cremona*, Indian Prince, **A.M.** 370, cxi
 × *Dorchester Leraft*, xcv
 × *Dorchester*, *Magnolia*, **A.M.** 370, cx
 Saleden, **A.M.** 267, xcv
 × *Hawfinch*, *Buttercup*, **F.C.C.** 221, lxxvi
 Wheatley, **A.M.** 267, lxxxix
 × *Janette*, *Harben's* var., **A.M.** 221, lxxx
 Peach Blossom, **A.M.** 221, lxxx
 × *Jason*, *exquisitum*, **A.M.** 221, lxxx
 magnificum, **F.C.C.** 221, lxxix
 × *Lilian Sander*, *Leo*, **A.M.** 221, lxxx
 × *Louis Sander*, *Cooke's* var., **F.C.C.** 222, lxxvi
 × *Lyoth*, *Rosy Morn*, **F.C.C.** 222, lxxix
 × *Mopsa*, *Orchidhurst* var., **F.C.C.** 222, lxxx
 × *Penelope* exhb., lxviii
 × *Pharos*, *Golden Beauty*, **A.M.** 222, lxxvi
 × *Profusion*, *Grand Monarch*, **A.M.** 370, cx
 × *Rhodo*, *Exbury* var., **A.M.** 173, lii
 Trophy, xxviii, xxxv, lxxviii
 × *Woodcock*, *Bronze King*, **A.M.** 222, lxxx
Cyphomandra *betacea*, 545
Cypripedium × *A. de Lairesse*, clxxv
 acaule, 246
 × *Angel Luscombe*, *Ceylon*, **A.M.** 130, li
 arietinum, 246
 × *Balaclava*, *Brigadier*, **A.M.** 87, xxxviii
 × *Cameo*, **A.M.** 174, lxviii
 candidum, 246
 × *Diana Broughton*, *Lynbrook* var. **A.M.** 130, xlii
 × *Gatton Prince*, **A.M.** 130, xlii
 × *Kay-Kay*, *Sunny*, **A.M.** 87, xxxviii
 × *King George VI*, **A.M.** 130, xlii
 × *Lady Mona*, **A.M.** 87, xl
 Trident, **A.M.** 174, liii
 parviflorum, 246
 pubescens, 246
 Reginae, 245
 × *Resolute giganteum* exhb., lxxvii
 speciosum, *Siberian* form, **A.M.** 322, cix
 Trophy, xxxv, xl
Cyrtanthus *hybrid*, clxxiii
 sanguineus, clxxiii
Cytisus *Acton Phillips* exhb., cx
 Dorothy Walpole, 388
 fragens, 185
 Lord Lambourne, 388
 Maria Burkwood, 388
 nigricans, 236
 praecox, 388
 sessilifolius exhb., cx
 scoparius *Burkwoodii*, 388

Daboecia cantabrica, civ
 polifolia, 233
Dacrydium *biforme*, 447
Daedalacanthus *nervosus*, 186
Daffodil *Show*, ii, xlv, lxxxi, xc, xcii
 trials at Gulval, lxxiv
 classified list, lxxxi
Daglish, *Eric Fitch*, *ses Miles Hadfield*
Dahlia *aberrant*, cxcvii
Dahlias at *Wisley*, 365
 "Dahlias," by *Stanley J. Spencer*, reviewed, 517
Dahlias selected for *trial*, clx, clxii, clxxv, clxxvii, cxc
Damson Merryweather, 300
Daphne × *Burkwoodii*, *Somerset*, **A.M.** 322, cix
 Cneorum, lxxii
 hybrida, 234
 indica rubra, 447
 Mezereum, 447
 stomata, 482
 odora, 185, 234
 rupestris grandiflora, cvi
Darlington, *C. D.*, "Recent Advances in Cytology," 468
Datura meteloides, 472
 sanguinea, 185
 suaevolens, 185
Daucus *Carota*, *eelworm*, 337
Davidia involucrata, 351
Day, *Harry A.*, "Rosecraft: A Guide to Rose Growing," 328
 "Your Flower Garden," 136
Delphinium *Belladonna*, cxlviii
 Lugano, cxliii
 Berwinpet exhb., cxliv
 bicolor, 243
 Blue Cambria, **A.M.** cxxix
 Bluebell, cxxix
 Bluestone, cxliii
 cardinale, cxliii
 Chrystal exhb., cxxix
 Casewick exhb., cxxix
 Cavalier, cxxix
 Consolida, 188
 Coronation, **A.M.** cxxix
 Elizabeth, cxliii
 Eventide exhb., cxxix
 Famille Rose, exhb., cxxix
 Hugh Lang exhb., cxxix
 Jean Smith, cxliii
 Lavengro, cxxix
 Lorenden Double Mauve, cxliii
 Lorna, cxxix
 Margaret Rose, cxxix
 May Lang exhb., cxxix
 Merstham Jewel, cxxix
 Myra Clements exhb., cxxix
 nudicaule exhb., cxliii
 paniculatum cxliii
 Picotee exhb., cxliii
 Rhapsody exhb., cxxix
 Robina Bickerton, cxxix
 St. Brelade exhb., cxxix
 tatsienense exhb., cxliii
 variation in, cxxvii
 Wrexham Dandy Boy exhb., cxliii

- Demnig, Alfred**, "Gewaechschaeuser und Heizungen," 465
- Dendrobium** × **Bali**, exhb., cxi
 × **Elisabethae** exhb., cxi
Macarthiae, Dr. E. Soysa, cxxvi
 × **Lousiae** exhb., cxi
Phalaenopsis Schroederianum, Laure Sladden, **A.M.** 87, xxxviii
 regium exhb., cxlix
- Dendrochilum glumaceum**, lxxvii
- Dendromecon rigidum**, 237
- Dennstaedtia punctilobala**, 247
- Deputations, vii
- Desborough, Mrs. A.**, on Flowering Shrubs in a Small East Dorset Garden, 229
- Desert plants, 521
- Desfontainea spinosa**, 236
- Deutzia albidia**, 351
 setchuensis exhb., cxlv
- Dianthus Allwoodii**, cvi, clix, clxxvi
 Bridget, cix
 basuticus exhb., cxlvi
 C. T. Musgrave exhb., cix, cxxix
 Delight, clxii, clxxiv
 Freynii exhb., cviii
 Kirkii, 227
 plumarius Ariel, cxxviii
 Ceres, cxxviii
 Emperor, selected for trial, cxxvii
 squarrosus roseus exhb., cxxii
 Sweet Wivelsfield Double Flowered, clix
 Giant Flowered, clix
- Diascia Barbrae**, 188
- Dicentra canadensis**, 241
 Cucullaria, 241
 eximia, 241
 peregrina pusilla, **P.C.** cxxvi
- Dicoma anomala**, 139
- Dictamnus Fraxinella**, 390
 albus, 391
 rubra, 390
- Didissandra Agnesiae**, 252
- "Die Kirschenorten der Deutschen Schweiz," by Dr. Fritz Kobel, reviewed, 177
- Diervilla Middendorffiana**, 385
- Dimorphotheca Ecklonis**, 447
 jucunda, 227
- Diosphaera asperuloides**, **P.C.** clxxv
- Dipcadi serotinum** exhb., cxlvi
- Dipelta floribunda**, 235
- Diplacus glutinosus**, lxxiii, clxxiv
- Disanthus cercidifolia**, 238
- Discaria Toumatou**, 417
- Dodecatheon pauciflorum**, 244
- Dolichandros platycalyx**, 516
- Douglasia laevigata**, 515
- Draba polytricha** exhb., xvcii
- "Dragonflies of the British Isles," by C. Longfield, reviewed, 546
- Drimys aromatica**, 96, 101
 Winteri, 96, 230, 233
- Echinocactus Grusonii**, 526
- Echinopanax horridus**, 248
- Echinopsis**, 526
- Eelworm, Root-knot**, 336, 341
 effect of potassium iodide upon, cxcii
 Stem, 341, 346
- Elaeagnus macrophylla**, 388
 pungens aureo-variegata, 388
- Elaeocarpus cyaneus**, 185
- Elm notes, 1935, 139
- Elmham Hall, 501, 505
- Elymus arenarius**, 486
- Embothrium coccineum**, 230
- Emmenopterys Henryi**, 351
- Empetrum nigrum**, 243
- Encarsia formosa**, lxxii, lxxxv, ciii, cxx
- Endophyllum Sempervivi**, 285
- Epacris ardentissima**, clviii, clxxii
 hyacinthiflora, 184
 impressa, 184
 miniata, 184
- Ephiobolus graminis**, 109
- Epidendrum coriifolium**, 548
- Epigaea repens**, 241
- Epilobium angustifolium**, 248
- Epimedium grandiflorum** exhb., cvii
 Rose Queen, **A.M.** 268, xcvi
- Epipactis gigantea**, 245
- Epiphyllum**, 526
- Epithelantha micromeris Greggii**, 526
- Equisetum arvense**, 474
- Eranthemum seticalyx**, 186
- Erica arborea**, 233, 326
 alpina, 233, 326, lxxii
 australis, 233, xlviii, lxxii
 Mr. Robert, 233, xlviii
 canaliculata, 185
 Boscawen's var., **A.M.** 174, lii
 candidissima, 185
 carnea, xxxvi, lxxii, xcv
 Springwood Pink exhb., lxxxix
 Vivellii, xxxvi
- Cavendishiana**, 185
- cinerea**, civ
 × **darleyensis**, xxxvi
- gracilis**, 185
 alba, 185
- hyemalis**, 185
- lusitanica**, 233, xxxvi
- mediterranea**, xlviii, lxxii
 Brightness, xlviii
 superba, xlviii
- Pageana**, **A.M.** 268, xciv
- persoluta alba**, 185
- quadrangularis**, **A.M.** 174, lxvii
 alba exhb., lxviii
- regerminans**, 185
- Tetralix**, civ
- umbellata stricta** exhb., cxii
- Veitchii**, 233
- verticillata major**, **A.M.** 454, clxxiv
- Willmorei**, 185
- Erigeron aureus**, **A.M.** 268
 glabellus B. Ladhams', 390
 speciosus Quakeress, civ
- Erinus alpinus** Mrs. C. Boyle exhb.,

Ebenus cretica, lxxxv
Eccremocarpus scaber, 447
Echeveria leucotricha, 528

- Eriogonum Wrightii* subscaposum, cxcii
Eriosoma lanigerum, 424
Eriostemon buxifolius, 185
 intermedius, 185
 myoporoides, 185
 scaber, 185
Eritrichium tergovienae, exhb., cviii
Erlestone Park, lxxiv
Eryngium alpinum, 391
Erythrina Crista-galli, 185
Erythronium albidum, 241
 americanum, 241
 grandiflorum, 242, 515
 montanum, 242
Escallonia C. F. Ball, 388
 Iveyi, 388, civ
 langleyensis, 388
 macrantha, 388
 montevideensis at Wisley, 84
 revoluta exhb., cxlix
Eschscholzia, 523
Eucalyptus citriodora, 189
 coccifera seedling exhb., clxii
 ficifolia, 446, clx, clxxiv
 Globulus, 189
 MacArthuri exhb., clxxvii
 radiata exhb., xxxi
 viminalis exhb., clxxvii
Eucomis punctata, 187
Eucryphia Billardieri, 109, 236
 cordifolia, 95, 236
 glutinosa, 95, 100, 236, cxxi
 × *Nymansay*, 95
 Mount Usher var., clxxvii
Euonymus europaeus, 388, 478
 coccineus, 388
 weeping, cxcviii
 japonicus, 478
Eupatorium atrorubens, 186
 ianthinum, 186
 macrophyllum, 186
 micranthum exhb., clxxiv
 purpureum, 244, 248
 Purpureum, 186
Euphorbia bupleurifolia, 471
 complexa, 471
 Franksiae, 471
 fulgens, 527, xli
 pallida, A.M. 131, xli
 gatbergensis, 471
 globosa, 471
 grandialata, 471
 grandicornis, 471
 griseola, 471
 passa, 471
 polygona, 471
 splendens, 523
 tortirama, 471
 tubigians, 471
 Woodii, 471
Eustoma Russellianum, 188
Exacum affine, 188
Examinations in Horticulture, viii
Examiners, Board of, 53
Exhibitions, general notes, 33
Exhibits, small, from Fellows, xxix, xxxv, lxxxv
Exobasidium Rhododendri, cxlviii
Expeditions, ix
 "Family Garden," by M. James, reviewed, 468
 Farseti clypeata, xxx
 Fasciation and dichotomy, 276
 Fatschedera × *Lizei*, B.O. xxxvii, xxxviii
 "Feeding of Crops and Stock," by Sir A. D. Hall, reviewed, 272
 Feijowa Sellowiana exhb., cxlix
 Felicia angustifolia, 447
 Ferns, tree, 104
 Ferocactus uncinatus, 526
 Filipendula rubra, 244
 Flora of China: early investigations, 347
 "Flora des Sudens," reviewed, 375
 Flower arrangement competition for Amateurs, cliv
 "Flower Garden Primer or Gardening without Tears," by Julia H. Cummings, reviewed, 178
 Flowers, colours of, 179
 Forsythia, fasciated, lxxviii
 Fossil wood, lxxviii, cxxiii
 Fothergilla monticola, A.M. 542, cxcii
 Fouquieria splendens, 522
 Foxglove stomata, 482
 Francoa ramosa, 186
 Fraxinus Excelsior aurea, cxcviii
 Freesia alba, 519
 Armstrongii, 519
 caryophyllacea, 519
 Enchantress, A.M. 222, lxvi
 flava, 519
 George Washington, *F.C.C. 222, lxvi
 Gertrude Carlée, 222, lxvi
 its history, 519
 lactea, 519
 Leichtlinii, 519
 picta, 519
 refracta alba, 519
 Leichtlinii, 519
 rubella, 519
 Sparrmannii, 519
 xanthospila, 519
 Yellow Surprise, *A.M. 222, lxvi
 Fremontia californica, 237
 mexicana, 237
 Friend, G. E., on Vegetables and Fruit in Diet, 286
 Fritillaria acmopetala, 330, 333, 334
 armena, 333, 334
 caucasica, 332, 333, 334
 crassifolia, 334
 dasyphylla, 334
 Drenovskii, 332, 336, xcvi
 Ehrhartii, 333
 Elwesii, 333, 334
 Forbesii, 334
 glauc, A.M. 322, cviii
 glaucoviridis, 227, 331, 332, 334
 gracilis, 332, 334, 336
 graeca, 331-2, 333
 Guicciardii exhb., lxxvii
 Guicciardii, 331, 332
 Gussichiae, 332
 karadaghensis, 334
 latifolia, 330, 331, 333, xcvi

- Fritillaria latifolia aurea*, 333
lutea, 333
macedonica, 331
macrandra, 332
Meleagris, 331
messanensis, 333
montana, 332, 334
neglecta, 332
nigra, 332, 334, lxxvii
nobilis, 333
obliqua, 332, xcvi
Olivieri, 334, lxxxix
oranensis, exhb., xcvi
orientalis, 332
pontica, 331
Purdyi, **A.M.** 322, cviii
pyrenaica, 232
racemosa, 332
Regis-Georgii, 333
rhodocanakis, 332
Sibthorpiana, 333, lxxxvii
Stribnyi, 333
tenella, 332, 334
tulipifolia, 333
viridis, 334
 Fritillaries in the Near East, 329
 Fruit and Vegetables in Diet, 286
 Fruit-growing, Jones-Bateman Cup for research in, 32, clvi
 Fruit Leaf-hopper, 211
 Trials at Wisley, Commercial, 53, 296, v
Fuchsia corymbiflora, 186
 Colensoi, 417
 excorticata, 417, 447
 fulgens exhb., cxxviii
 magellanica Caledonia, 192
 procumbens, 417
 Riccartoni, 388
 Rose of Castile exhb., clxxiv
 Fussell, G. E., on market gardening fifty years ago, 539

Galanthus Alleni, 519
 Ikariae, 519
 Olgae, clvii
 plicatus, Warham var., **F.C.C.** 174, lii
 Garden in the Antipodes, 446
 Garden Notes, 326, 419, 513, 544
 "Garden Year," by H. Cowley, reviewed, 272
 "Gardener's Companion," by Miles Hadfield, E. A. Bunyard, Jason Hill, R. N. Giffard Woolley and Eric Fitch Daglish, reviewed, 176
 "Gardener's Testament," by Gertrude Jekyll, reviewed, 468
 "Gardening for Finance or Fancy," by Fred Marshall, reviewed, 225
 "Gardens and Gardening: Lay-outs for Small Owners," by F. A. Mercer, reviewed, 225
 Gardens, inspection of, 18
 Gardens of easy maintenance, 377, 380, 381
 Garner, H. V., "Profit from Fertilizers," 91
Garrya elliptica, xxxvi

Gasteria, 528
 Gatin, C. L., "Les Fleurs des Bois," 421
Gaultheria Forrestii, **A.M.** 95, 322, cvii
 Merrilliana, **P.C.** cxlix
 nummularioides exhb., cxlvi
 Shallon, 247
 sp. K.W. 8725, **P.C.** liii
 thibetica exhb., cxlvi
 trichophylla exhb., cxlvi
 Gaya *Lyallii*, **A.G.M.** 417
 General Meetings, xxx, xxxvii, xlix, lxxv, lxxiv, lxxxvii, cv, cxxii, clx, clxxiii
Genista aethnensis, 236, 388, civ, cxxi
 hispanica, 388
 leptophylla, 513
 Lydia, **A.M.** 371, 513, cxxv
 monspeliensis, 236
 tinctoria, 513
 Gentian Flora of S. Tibet, 376
 Gentians of China, 376
Gentiana acaulis, 163, 419
 altorum, 376
 ampla, 548
 Andrewsii, 244
 aphrosperma, 376
 cephalantha, 376
 chakangensis, 376
 coelestis, 548
 crinita, 244
 depressa, 163-5, 168-9
 Farreri, cxxi
 flexicaulis, 376
 heleonastes, 376
 hexaphylla, 351
 septemloba, 376
 inconspicua, 376
 Kirishima Rindo, **A.M.** (Berry 1937), cxxi
 Kurroo brevidens, 351
 Licentii, 376
 Ludlowi, 376
 Makinoi, clxxiii
 microtophora, 376
 musciicola, 376
 oligophylla, 376
 oreodoxa, 548
 pseudodecumbens, 376
 puberula, 244
 quaterna, 376
 saxosa, 448
 simulatrix, 376
 sino-ornata, 373, 548, clvii
 praecox, cxxi
 x *stevenagensis* var., cxxi
 trichotoma, 351
 Veitchiorum, 548, cxxi, clvii
 verna, 231
 viatrix, 376
Geranium Renardii exhb., cxii
Gerbera Jamesonii hybrida fl. pl., cix
 Gesneriaceae, hardy and half-hardy, 249
 Geum Red Wings exhb., cvi
 Gevuina *Avellana*, 96
 "Gewächshäuser und Heizungen," by Alfred Demmig, reviewed, 465
Gilia californica, civ
 coronopifolia, 188, 520

ccxii PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

Gillenia trifoliata, 390
Gladiolus Abyssinia, 492, 497
 Ada, 489
 Alice Tiplady, 489
 Amelita Galli Curci, 485, 491
 America, 490
 American Beauty, 490
 Anna May Wong, clxx
 Anthony Eden, clxx
 Aquila, 490
 Baby Decorah, 491
 Bagdad, 491
 Betty Humphries, 493
 Bill's Fragrant, 491
 Blue Danube, 491
 Jay, 489
 Brightside, 492, 496
 Byron L. Smith, 490
 Capt. Abel Smith, clxx
 Capt. G. M. Churcher, 491, 493
 carinatus exhb., lxxvi
 Carlake, 492
 Chameleon, 490
 Charles Dickens, 490
 Cicely, 490
 Dawn, 489
 Debonair, 492
 Dorothy Dell, 492
 Ella May, 492
 Elora, 490
 Faun, 490
 Favourite, 490
 Fimbriatus, 490
 Fire Queen, 489
 Firecrest, 490
 Forest Sprite, 490
 Gay Hussar, 490
 Gladdie Boy, 490
 Gold, 490
 Golden Bronze, 490
 Golden Girl, 489
 Victor, 490
 Goldie, 492
 Hazel's Corsage, 492
 Incense, 491
 Irene, 493
 Janet, 491
 Jessie, 493
 John Alden, 490
 Joyce Adkins, 492
 J. S. Bach, 493
 La Argentina, 491
 La Luna, 489
 Laciniatus, 490
 Liberty, 490, clxxv
 Lotus, 491
 Maid of the Mist, 489
 Mandarin, 491
 Margaret Fulton, 491, 492
 Martha Phillips, 490
 Martha Washington, 490
 Mary Elizabeth, 491
 Mildred Louise, 492
 Mrs. Bothin, 490
 Mrs. Chas. A. Stevens, 491
 Mrs. C. P. Worley, 493
 Mrs. G. Kilner, 490
 Mrs. J. R. Walsh, 490
 Mrs. Leon Douglas, 490

Gladiolus modern, 489
 Mother Machree, 484, 490
 Netherland Prince, 491
 Nydia, 490
 Odin, 490
 Orange Butterfly, 490
 Glory, 490
 King, 491
 Sovereign, 491
 Otranto, 490
 Patricia Unwin, 492, 497
 Peace, 489
 Pelegrina, 491-3
 Phyllis Kelway, 489
 Picardy, 491, 492
 Pink Cloud, 490
 Primrose Princess, 490
 primulinus, 489, 493
 Princess Giovanna, 492
 Purple Glory, 490
 Red Fire, 490
 revolutus exhb., lxxviii
 Rival, 491
 Robert Brownlee, 492
 Royal Gold, clxx
 Pledge, 492, clxx
 Salmon Beauty, 489
 Sandusky, 490
 Sarah Palfrey, 491
 Sea Foam, 491
 Senorita, 490
 Sonatine, 493
 Sonia, 490
 Sovereign, 490
 striatus exhb., cvii
 Sunnymede, 490
 Sunshine Girl, 491
 Queen, 492, 496
 Svengali, 491
 Sweet Lavender, 490
 Sweetheart, 492
 Swiss Maiden, 490
 Terra-cotta, 491
 The Unknown, 492
 Tobersun, 490
 trichonemifolius exhb., lxxvii
 Triumph, 490
 Vagabond Prince, 492
 Vienna Woods, 492
 viperatus, A.M. 174, lxxvii
 Vivid, 492
 War, 489
 White Butterfly, 491
 Glory, 490
 Will Scarlet, 491
 William Copeland, 492
 Yellow Perfection, 491
 Wonder, 490
 Zona, 490
Gloriosa Rothschildiana, 187
Godetia Histon Glory, clxx
Gooseberry Bedford Giant exhb.,
 cxxxvii
 Early Green Hairy, 302
 Green Gem, 302, 303, cxxxvii
 Ingall's Prolific Red, 302
 Lancashire Lad, 302, cxxxvii
Gordonia anomala, 94
Granadilla, 544-5

- Graphocephala coccinea*, 210-12, 213
 Green, D. E., on *Antirrhinum rust*, 330
 on *Rust-resistant Antirrhinums*, 214, 334
 Greengage Flowers, lxxviii
 "Greenhouse Culture for Amateurs,"
 by E. G. Wheelwright, reviewed, 225
Grevillea acanthifolia, 126
 alpina, 234
 asplenifolia, 185
 Gaudichaudii, 126, 127
 juniperina sulphurea, 124, 125, 126
 laurifolia, 126
 Preissii, 124, 126
 punicea, 185
 robusta, 189
 rosmarinifolia, 125, 234
 x semperforens, 117, 124, 125, 126
 sulphurea, 124
 rosmarinifolia, 127
 Thelemanniana, 124, 125, 126, 185
 thyrsoides, 234, 235
Griffinia Blumenaria, 209
Grindelia chiloensis, 519
Griselinia littoralis, 95
 Guava, 545
 Guillaumin, A., "Les Fleurs de Jardins," 421
Gymnocladus sinensis seeds attk. by beetle, lxvi
Gypsophila Oldhamiana, 472
 paniculata Rosy Veil, 390

Haberlea Ferdinandi-Coburgi, 250, 251
 rhodensis, 250
 alba, 251
 at Glasnevin, 252
 virginalis, 251
 at Glasnevin, 253
Habranthus, 195, 208
 Hadfield, Miles, E. A. Bunyard, etc.,
 "The Gardener's Companion," 176
 Hales, William, the late, cxxii
 Hall, Sir A. D., on classification of
 Garden Tulips, 78
 "The Feeding of Crops and Stock,"
 272
Hamamelis japonica arborea, 234
 mollis, 234
 virginiana, 234, clxxii
 Haploids and Polyploids, experimental
 production of, 227
 "Hardy Californians," by Lester
 Rowntree, reviewed, 136
 "Hardy Fruit Growing," by Sir
 F. W. Keeble and A. N. Rawes,
 reviewed, 226
Haworthia, 528
 Hay, Roy, "Annuals," 422
 Heath, A., "Country Life Cookery
 Book," 421
 Heath Garden, Wisley, 84, 542
Hedychium Gardenianum exhb., clxii
Helenium Baronin Lindon exhb., clxii
 Bigelovi, 389
 The Bishop, A.M. 413, cxliv
 virescent, clxi
Helichrysum humile, 185

Helichrysum frigidum exhb., cxlvi
Helleborus niger, 232
Helxine Soleirolii, 184
Hemerocallis aurantiaca, 408, 409
 aurantiaca major, 409
 citrina, 407, 408
 disticha, 406
 flore pleno, 406
 Dumortieri, 408
 esculenta, 410
 exaltata, 409
 flava, 399, 400, 402, 404-5
 Forrestii, 405, 409
 fulva, 244, 400, 402, 404-6, 409, 410
 Kwanso, 406
 longituba, 410, 411
 maculata, 407
 on a Chinese scroll painting, 397
 rosea, 411
 graminea, 402, 405
 Kwanso foliis variegatis, 406
 Middendorffii, 408, 410
 minor, 402, 405
 multiflora, 410
 nana, 409
 growing wild, 404
 plicata, 409
 rutilans, 408
 Sieboldii, 408
 Thunbergii, 407, 410
Heterocentron roseum, 186
Heterodera marioni, 336, 337, 340, 341,
 346
 radicicola, 336, 337, 339, 340
 schachtii, 336, 339, 340, 341, 342, 346
Herpetospermum pedunculatum, 227
Helixyra flava, 139
 simulans, 139
Helleborus Kochii, A.M. 131,
Heuchera brizoides, 472
 monograph of the genus, 472
Hibbertia dentata, 184
Hibiscus syriacus Woodbridge, A.M.
 542, cxciiv
Hidalgoa Wercklei, 184
 Higgins, V., on desert plants, 521
 Hill, Jason, see Miles Hadfield
Hippeastrum, 195, 208
 Coronation exhb., cvi
 Grania exhb., l
 J. Howlett, lii
 Red Velvet exhb., cvi
Hippophae rhamnoides, 385
Hoheria populnea, 95
Holly foliage variants, xxxix
Homeria collina, 472
 Comptonii, 472
 ochroleuca exhb., cvii
 Honesty, swellings on roots of, cxxiii
Hoodia, 527
 Horticultural Colour Chart, xxxv, clvi
 "Horticultural Note-Book," by J. C.
 Newsham, reviewed, 421
 Horticultural Sundries, cxli, clvi, clxx
 Horticulture, Science progress applied
 to, 100
 House Leek, stomata, 482
 Huernia, 527
Humea elegans, 188

- "Humus : Origin, Chemical Composition, and Importance in Nature," by S. A. Waksman, reviewed, 274
Hyacinthus amethystinus, 232
Hyde, Rev. T. A., on cultivation of succulents, 544
Hydrangea, blue, problem of, 304
colour and chlorosis in, xciii
Hortensia, 304
hortensis, 304, 308, 313
macrophylla, 304
opiloides, 304
paniculata, 238
quercifolia, 238
Sargentiana, 95, 100
Hypericum empetrifolium, **A.M.** 413, cxxix, cxlvi
serrata, 304
Hydrocotyle vulgaris, epidermis, 429
Hypericum cuneatum exhb., cxlvi
hirsutum, effect of lime, 477
Moserianum, 388
patulum, 388, civ, cxxi
Forrestii, 388
Henryi, 388
oliganthum, 472
senanense, 472
sp., effect of competition, 480
Hypocalymma robustum, 185
- Idesia polycarpa*, 98
Ilex Aquifolium Hodginsii, 384
aureo-marginata, 386
camelliaefolia, 386
Hodginsii, 386
insignia, 109
Pernyi, 349
Silver King, 386
Queen, 386
Watereri, 386
Illicium religiosum, 348
Impatiens Holstii, 186
Oliveri, 186
Sultani, 186
Incarvillea Delavayi, 350
" *Insects of the British Woodlands*," by R. N. Chrystal, reviewed, 466
Ionopsis paniculata exhb., clxxvii
Ipomoea coccinea, 184
Learii, civ, cxxi
Quamoclit, 184
rubro-caerulea, 184
versicolor, 184
Ipomopsis rubra, 520
Iris acutiloba exhb., cxi
Aden, cxxvi
Bakeriana exhb., xli
Balroudour, cviii
Cantuar exhb., cxxvi
Celestiale, selected for trial, cxxvi
Cherry Ripe exhb., cxxvi
chrysographes × *Grant-Duffii*, cxxix
rubella, **A.M.** 371, cxxvi
Coralie exhb., cxxvi
Crown Jewel exhb., cxxvi
Delavayi, 350
Desert Gold, **A.M.** 131
Dusky Chief exhb., cxxvi
Iris eelworm, 338
Fleur d'Amour, cxxvi
Gauntlet exhb., cxxvi
Gentius, selected for trial, cviii
Golden Chalice exhb., cxxvi
Goblet exhb., cxxvi
Hind, **A.M.** 131
Miller exhb., cxxvi
gracilipes exhb., cxi
Group, 14, iv, lxxi, lxxxiii
Ivory Picture exhb., cxxvi
japonica var. exhb., xcvi
Joanna, **F.C.C.** 131
Joycelle, cxxvi
Kaempferi, cxxvii
Khoosroo, cxxvi
Lemon Giant exhb. cxxvi
Lilac Satin exhb., cxi
Mesartim, **A.M.** 131
Misty Morn exhb., cxxvi
ochraurea, **A.M.** 371, cxxix
pallida dalmatica, **A.G.M.** 450
paradoxa exhb., cxi
Puck, cviii
pumila atrocoerulea, 391
Charmer, 389
Purple Glory exhb., cxxvi
Rangatira, **A.M.** 131
Reflections, cxxvi
Senecio, **P.C.** cxxix
Shiddan, cxxvi
Shot Silk, **A.M.** 132
Southern Heights, cxxxvi
Southland exhb., cxi
spuria hybrids exhb., cxxix
Stratosphere, **A.M.** 132
Sword of State, cxi
tingitana, xli
Topaz exhb., cxxvi
unguicularis, 235, xxxvi
alba, 392
versicolor, 247
Violet Bonnet, cxxvi
White Sentinel, cxxvi
Zebra exhb., cxxvi
" *Iris Culture for Amateurs*," by R. E. S. Spender and L. F. Pesel, reviewed, 466
Ixia caryophyllacea, 519
paniculata, **A.M.** 268, xciv
- Jacaranda ovalifolia*, 189
Jacobinia carnea, 186
chrysostephana, 187
James, M., "The Family Garden," 468
James, The Hon. R., on Old Garden Roses, 190
Jankaea Heldreichii, 250
Jasminum azoricum, 184
dispermum, **A.M.** 174, lxxvii
grandiflorum, 184
primulinum, 184, 351
rex, 184
× *stephanense*, **A.M.** 413, cxlv
Jeffersonia dubia, **A.M.** 268, xcvi
Jekyll, Gertrude, "A Gardener's Testament," 468

- Johnson, A. T., "A Woodland Garden," 273
 Johnstone, G. H., on Trewithen, Cornwall, 93
 Juniperus Coxii, fruit of, xxxvii
 formosana, xxxvii
 virginiana, 180

 Kalanchoe beharensis, 528
 madagascariensis, 528
 Kalmia angustifolia, 247
 polifolia, 243
 Kalmiopsis Leachiana, **A.M.** 223, lxxxvii
 Keeble, Sir F. W. and Rawes, A. N., "Hardy Fruit Growing," 226
 Kleinia, 528
 Kniphofia Leviathan, clxii
 Macowani, 390
 rufa, 389
 Knowles, F., "A Practical Course in Agricultural Chemistry," 178
 Kobel, Dr. Fritz, "Die Kirschensorten der Deutschen Schwieg," 177
 Kochia trichophylla, 189
 Kolisko, L., "The Moon and the Growth of Plants," 89

 Laburnum Alschingeri, 386
 Vossii, 386
 vulgare, 386
 Lachenalia Durnsii exhb., lxviii
 Laelia x Firefly, Aureole, **A.M.** 223, lxxvi
 Laliocattleya x Adonis grandiflora exhb., clxii
 x Alma, Coronation, **A.M.** 322, cx
 x Invicta, Accession, **A.M.** 542, cxiv
 x Labiosa, 542
 x Lorna exhb., cxlv
 x Momus, 542
 x Nephys, superba, **A.M.** 223, lxxx
 Lantana Camara, 185
 salvifolia, 185
 Lapageria rosea, 236, 252, clxxii
 Larix laricina, 472
 Lathraea Clandestina, 232
 Laurus nobilis, 180
 Lavandula Spica rosea exhb., cxlix
 Stoechas, cxv
 Lavender, leaf section, 481
 "Lawns," by Messrs. Sutton, reviewed, 466
 Lawrence, W. J. C., "Practical Plant Breeding," 547
 Leaf-hopper, adult, 212
 Leather-jackets on lawns, 419
 Ledum groenlandicum, 247
 nipponicum exhb., xcv
 Leonotis Leonurus exhb., clxxvii
 Leptospermum baccatum, 233
 Chapmanii, 233
 lanigerum, 233
 grandifolium, 376
 Nicholii, 233
 Rodwayanum, 233, 376
 Leptospermum scoparium, 233
 roseum, **F.G.C.** 322, cix
 sp. C.2321, 376
 Leptosphaeria herpotrichoides, 109
 Leptotes bicolor, xcv
 "Les Fleurs de Jardins," by A. Guillaumin, reviewed, 421
 "Les Fleurs des Bois," by C. L. Gatin, reviewed, 421
 "Les Plantes Alimentaires," by D. Bois, reviewed, 469
 Leschallas, H. P., "The Small Alpine Garden," 375
 Leschenaultia biloba, 185
 Le Sueur, A. D. C., on Care of Ornamental Trees, 141
 Lettuce, eelworm, 338
 Leucanthemum depressum exhb., cl
 Leucocoryne ixoides odorata, lxxix
 Leucopogon lanceolatus, 184, 185
 Lewisia brachycalyx, 227
 Kelloggii, 227
 Liabum ovatum, 472
 Liatris scariosa, 248
 spicata, 248
 Libertia formosa, 392
 Libocedrus decurrens, 81
 Library, Lindley, 14, vii, cxxx, clii, clxiii, clxxviii
 Ligustrum ionandrum, 384
 Lilies, beetle injurious to, clx
 in New York Garden, 140
 premature defoliation of, 140
 Liliun Alexandrae, 139
 Bolanderi exhb., cxxviii
 Brownii, 81, 139
 colchesteri, 81, 82, 139
 Burbankii, 140
 x *burnhamense*, 139, 376
 canadense, 244
 candidum, cxliv
 x *testaceum*, cxliv
 centifolium exhb., cxxviii
 x *crovidii*, **P.C.** cxlv
 dauricum luteum, 140
 Davidi, 349, civ
 Oriole, **A.M.** 323, cx
 Douglas Ingram exhb., cxxv
 Duchartrei, 349
 formosanum, 419, cxxi
 giganteum, civ
 Hansonii, 140
 Henryi, cxxi, clxii
 japonicum, 139
 x *Lilian Cummings* exhb., cx
 longiflorum, 441
 x *Lyla McCann*, **A.M.** 323, cx
 x *Manglesii*, Stooke's variety, **A.M.** 413, cxlv, cxlvii
 x *Marhan* in Canada, 140
 maritimum exhb., cxxviii
 Martagon, 140
 neilgherrense, 139, 376
 nobilissimum, 139
 x *Orange King*, **A.M.** 414, cxlv
 x *pardaboltii*, 140
 Dimsdale's var., 140
 nobulbosum, 404
 pardalinum, 510

Lilium pardalinum Dimsdale's Yellow,

A.M. 510

giganteum, 140

parvum exhb., cxxviii

philadelphicum, 244

regale, civ

rubellum, lxxxvi, cxxv

Sargentiae, clxx

× *Scottiae*, 139

× *Sunstar* exhb., cxlv

superbum, 244, civ, cxxi

Szovitsianum, lxxxvi, civ

× *T. A. Havemeyer*, **A.M.** 454, clxxii

taliense, **P.C.** cxlv

tenuifolium, 350

testaceum, cxlv

Thunbergianum, *The President*, cx

tigrinum Diploid, 140

Fortunei, 140

splendens at Wisley, 80

Wallichianum, 139, 376

Wardii, civ

Willmottiae, civ

× *Thunbergianum*, 139

Lily competition, new hybrid, cxlvii

Group, 13, iv, lxxxiv, cxxxix, clv

Lily-of-the-Valley, stomata, 482

Limonium arborescens, 185

Bonduellii, 189

brassicaefolium, 185

macrophyllum, 185

profusum, 185

roseum, 185

sinuata, 189

Suworowi, 189

Linaria alpina concolor, 232

stomata, 482

Cymbalaria, 180

maroccana, lxvii

Linnaea borealis, 241, 247

Linum arboreum, 389

grandiflorum, 189

monogynum, 448

narbonense, 391

perenne, eelworm, 337

viscosum, civ

Liquidambar laevis exhb., xxxi

Liriope Muscari exhb., clxxv

spicata variegata, 184

Liriophodelus phoenicus, 400

Lithops, 527

Lithospermum angustifolium, 244

diffusum erectum exhb., xcvi

multiflorum, 244

rosmarinifolium, 234, liii

Lobelia cardinalis, 244

Kelmscott, clxxvi

Erinus, 189

Fergussonii exhb., cxii

tenuior, 189

Lobivia, 526

Lolium perenne, 380

Lomatia obliqua exhb., cx

tinctoria, 235

Longfield, C., "Dragonflies of the British Isles," 546

Lonicera arizonica exhb., cxxv

fragrantissima, 235

Lonicera × *grata*, **A.M.** 414, cxlv

nitida, 384

quinquelocularis translucens, cxcviii

Standishii, 235

xerocalyx, 96

yunnanensis ligustrina, 384

Lophophora Williamsii, 526

Lotus Bertholetii, lxxxv

peliorhynchus, 94

Lucerne, eelworm, 338

Luculia gratissima, 183, 185

rosea, 447

Pinceana, 183

Lupinus arboreus Baddow Blue, cxxiv

polyphyllus, 179

Cavalier, **A.M.** 371, cxxiv

Delightful, **A.M.** 371, cxxiv

Eileen Reave, **A.M.** 371, cxxiv

Jean Smith, **A.M.** 371, cxxiv

La France, **A.M.** 371, cxxiv

Lavender Bee, 371, cxxiv

Maize Queen, 371, cxxiv

Monster, **A.M.** 371, cxxiv

Robert Wood, **A.M.** 372, cxxiv

Sunkist, **A.M.** 372, cxxiv

Windsor Lad, **A.M.** 372, cxxiv

rivularis, 243

Luxford, Keith, "Culture of the *Chrysanthemum*," 177

Lycaste × *Balliae*, lxxx

× *Ebor* exhb., xlii

× *Queen Elizabeth*, **A.M.** 372, cx

Lychnis Flos-cuculi *Her Majesty*, cx

Lycopodium obscurum, 247

Lynch, R. S., on Gardens of easy

maintenance, 377

Lyonia macrocalyx, 472

Lythrum *Rose of Letchworth*, cxlix

Macleania insignis, xlviii

Maesa indica, lxxviii

Magnolia Campbellii, 98, 99

Delavayi, 350

fuscata, 231

globosa, 376

tsarongensis exhb., cxxv

grandiflora, 96

ferruginea, 233, 236

Kobus, 233

mollicomata, 99

parviflora, 180, 233

rostrata, 98, 232

salicifolia, 233

Sargentiana, 98

Sieboldii, 376

sinensis, 376

× *Wilsonii* (?), **A.M.** 414, cxlix

Soulangiana, xlviii

Sprengeri *diva*, 99

stellata, 351, xlviii

virginiana, civ

Watsonii, 233

Wilsonii, 233, 376, 414, cxlix

Maianthemum canadense, 241

Maize cobs, variegated, xlix

Malus Arnoldiana exhb., cvii

floribunda, 386

Goldsworth Red, cxci

- Malva umbellata* exhb., cxlix
Mammillaria, 526
 microcarpa, 240
Mandevilla suaveolens, 184
Manettia inflata, 187, 189
 Mansfield, B. P., on a garden in the
 Antipodes, 446
 "Manures and Manuring," reviewed,
 421
Marcia caerulea exhb., cxxv
 Marigold, dwarf African, Hatfield
 King's Cup, clxxvi
 Market garden, fifty years ago, 538
Markhamia platyclayx, 516
 Marshall, Fred, "Gardening for Fi-
 nance or Fancy," 225
 Martin, H., "The Scientific Principles
 of Plant Protection," 91
 Massee, A. M., "The Pests of Fruits
 and Hops," 469
 Masters Lectures, 61, 112, 153, 425,
 xxviii, xxxiv
Maurandia Barclaiana, 184, cx
 scandens, 184
 Meade, J. R., "Adam's Profession and
 its Conquest by Eve," 468
Meconopsis argemontha, 472
 bella, 472
 betonicifolia, 350
 Florindae, 472
 Georgei, 472
 horridula lutea, 472
 integrifolia, 472, xlviii
 lancifolia Georgei, 472
 lyrata Florindae, 472
 napaulensis, civ
 paniculata, 472, civ
 Prattii, 515
 quintuplinervia, 351
 × *Sheldonii*, A.M. 323, cx
 Sherriffii, 472
 simplicifolia Baileyi, 97
 sinuata, 472
 villosa, 472
 Medal, P. D. Williams Memorial, 324,
 327, ii
 offered for new hybrid Lily, lxxxiv,
 cii
Medeola virginica, 244
Medicago arborea, 447
Medinilla Scortechinii, 376
Melia Azedarach, 349
Melianthus major, 189
 Melliard, R. A. Foster-, "My Garden by
 the Sea," 272
Melon Coronation exhb., cxxiii, clxi
 eelworm, 338
 Mercer, F. A., "Gardens and Garden-
 ing : Lay-outs for Small Owners,"
 225
Mertensia franciscana, 520
 Horneri, 520
 longiflora, 520
 North American, monograph of, 520
 pratensis, 520
 primuloides exhb., xcvi
 pulchella, 520
 sibirica, 244
 tibetica exhb., xcvi
Mesembryanthemum, 526, 528
Metrosideros lucida, 447
 tomentosa, 447
Michelia doltsopa, 95
 figo, 231, 233
Microstylis uniflora, 245
 Miller, H. F. R., on *Sempervivums*,
 277
Miltonia × *Albanian*, Her Majesty,
 A.M. 372, cx
 × *Deirde Savile*, A.M. 372, cxxviii
 × *Kensington*, A.M. 372, cxi
Mimulus Lewisii, 244
 ringens, 244
Mitchella repens, 241, 245, 247
Mitella nuda, 241
Mitraria coccinea, 94, 236, 252, civ
Monarda didyma, 247
 Cambridge Scarlet, civ
Monotropa Hypopitys, 241
 uniflora, 241
 "Moon and the Growth of Plants," by
 L. Kolisko, reviewed, 89
Moricandia sonchifolia exhb., cx
Morina longifolia, 390
Moschosma riparium, 187
 Moth caught in flower, xxxvii
Muehlenbeckia australis, 417
 complexa, 417
 Mulligan, B. O., on *Grevillea* × *semper-*
 florens, 124
 "Municipal Parks : Lay-out, Manage-
 ment and Administration," by W. W.
 Pettigrew, reviewed, 518
Musa coccinea, cxxv
Muscari, prolific, cv
 Musgrave, C. T., on *Gentiana depressa*,
 163
Mutisia subulata, 140
 "My Garden by the Sea," by R. A.
 Foster-Melliard, reviewed, 272
Myosotidium nobile, 447, 449
Myosotis alba, 447
 uniflora exhb., xcvi
Myrtus communis, 185
 cuttings, acceleration of rooting,
 lxxiv
 Luma, civ
Naegelia, hybrid, 193
Narcissus abscissus exhb., cviii
 Aleppo exhb., cviii
 Arcadia exhb., cviii
 asturiensis, lxxiv
 Beryl Parr exhb., lxxiv
 Bryher exhb., lxxiv
 Bulbocodium, 321, xxxvi, lxxx
 Candour, A.M. 268, xcii
 Corinthian, xciii
 cyclamineus, xxxvi, xc
 Dava, A.M. 323, cvii
 Daytona, A.M. 268, xcii
 Diplomat, A.M. 268, xc
 Dunkeld exhb., cviii
 H. E. Buxton exhb., cviii
 Her Ladyship exhb., xcvi
 Ice Curtain exhb., xciii
 John Evelyn exhb., lxxvii

CCXVIII PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

- Narcissus* Joy Bells, xciii
juncifolius, 232
Lilibet exhb., lxxiv
Lydia exhb., xcvi
maximus, trial at Gulval, lxxiv
minimus, lxxiv
Mrs. William Copeland, xcvi
nanus, lxxiv
Owl, xciii
Polindra, *A.M.* 269, xcii
Prince, cvii
Principal, *F.C.O.* cvii
Pseudo-Narcissus × *N. Bulbo-*
codium, *B.O.* xciii, xcvi
pumilus, lxxiv
Sincerity exhb., cviii
Thoroughbred exhb., cviii
Wibbern exhb., cviii
Wisley hybrid, *B.O.* xciii
Nasturtium officinale variegatum, cx
Native dyes, lxxxvii
"Nature in Britain," reviewed, 136
"Nature's Remedies," by J. W. Bell,
 reviewed, 178
Neame, J. Armstrong, "Among the
 Meadow and Alpine Flowers of
 Northern Italy," 517
Neillia longiracemosa, 351
Nepeta Mussini, 391
Nephrolepis Hillii, *A.M.* 132, 1
Nerine filifolia exhb., xxxi
Nerium odorum, 513
Newsham, J. C., "Horticultural Note-
 Book," 421
Nierembergia caerulea, 520
Wisley Purple exhb., cxxv
hippomanica, 520
rivularis, 383
Niphonia Hookeri, clx
Nomocharis Henrici exhb., cxxv
pardanthina, 350
Notes and Abstracts, 139, 179, 227,
 276, 376, 424, 471, 519, 548
Nothofagus fusca, 447
Moorei, 95
Notices to Fellows, xxvii, xxxiii, xlv,
 lxix, lxxxi, ci, cxvii, cxxxvii, cliii,
 clxix, clxxxv
"Nuts," reviewed, 546
Nymphaea Rose Arey, *A.M.* 414, cxlix
- Oak*, large acorns, cxcii, cxcvii
Leaf-hopper, 211
Oat, branching, cxlviii, clxi, clxxvi.
Ochna serrulata exhb., cx
Ocotillo, *see* *Fouquieria splendens*
Odontioda Ethel L. Hanbury, xxxviii
Laura exhb., lxviii
Marie Antoinette, Jewel, *A.M.* 223,
 lxxvii
Odontoglossum citrosum Princess
Mary, *A.M.* 372, cx
crispum, Princeps var. exhb., cxxvi
Supreme, *A.M.* 269, xcv
 × *Jacquinetta*, *A.M.* 323, cx
 × *Mercutans* exhb., cxxvi
 × *Molyneux, Shalstone*, *A.M.* 323,
 cvii
- Odontoglossum* × *Neron, Jean Camp-*
bell, F.C.O. 132, xlii
 × *Olympia*, cxciv
 × *Perryanum, Shalston, A.M.* 372,
 cxxviii
 × *Petulum magnum, A.M.* 87, xxxii
 × *Thecla*, clx
 × *Tordonia, A.M.* 373, cxi
 × *Viscountess Ullswater, A.M.* 373,
 cx
Trophies, xxxv, xlvii
Odontonia Amphea exhb., xxxii
Andromeda, Ruby, A.M. 132, xlii
Nesta, cxi
Oenothera missouriensis, 389
Oidium Tuckeri, 108
Olearia angustifolia, 447
avicenniaefolia, 236
fragrantissima, 417
Hectori, 417
lineata, 417
odorata, 417
semidentata, 236
stellulata, 231, 236
virgata, 417
Omphalodes verna, 515
Omphalogramma Delavayi, 350
Oncidium Forbesii Measuresianum,
A.M. 88, xxxi
luridum Golden Glory, A.M. 373,
 cx
Mantini magnificum, A.M. cxcviii
Ononis minuata exhb., cviii
rotundifolia exhb., cx
Ophrys aranifera var. exhb., xcv
fusca exhb., li
Opuntia, 524, 526
Rafinesquei, 240
versicolor, 476
Orchards, cross-pollination in, xlix
Orchid butterfly albino, cxxiii
Orchis foliosa, civ
spectabilis, 245
Oreocharis Forrestii, 251, 252, 253
Ornithogalum arabicum, A.M. 454,
 clxii
Saundersiae, cxcvi
thyrsoides, clxii
umbellatum, 244
Orostachys spinosus, 525
Osmanthus Delavayi, 350
Osmarea × *Burkwoodii*, lxvii, lxxix
Osmunda cinnamomea, 247
Claytoniana, 247
regalis, 247
Ourisia macrocarpa, lxxii
- Paeonia albiflora Pottsi*, 348
arborea, eelworm, 338
Argosy, A.M. 323, cx
Cambessedesii, 231, xxxvi
cretica, xlviii
decora exhb., cx
Delavayi, 350
obovata rosea exhb., cx
pubens exhb., cx
Smouthii exhb., cx
Paeony Kelway's Majestic exhb., cxxv

- Pancratium illyricum*, **A.M.** 323, cx
Pansy Coronation Gold exhb., cix
 D. J. Reay exhb., clxxvii
Papa amarilla, 75
 lisa, 69
Papaver orientale hybrid exhb., cxxv
 Peter Pan, 390
Paphiopedilum superbiens, 520
 Wardii, 520
Paraquilegia grandiflora exhb., lxxxvii
Parasyringa sempervirens, cxxi
Parrotia persica, 386
Parthenocissus tricuspidata Veitchii,
 A.G.M. 52
Pasithea coerulea exhb., lxxxix
Passerina dioica exhb., lxxiv
Pasiflora caerulea, 184
 edulis, 544
 quadrangularis, 544
Passion fruits, 544-5
Pastinaca sativa, eelworm, 337
Paterson Inlet, Stewart Island, 448
Patience, H., "Cordon Culture of
 Apples," 465
Paulownia Fargesii, 350
Pea eelworm, 338
Peach H. S. Rivers exhb., clxxvi
Pear Beurré Hardy, xlix
 Superfin, xlix
 Christmas exhb., xli
 Craig's Favourite, xlix
 Doyenné du Comice, 85, 86, xlix
 Josephine de Malines exhb., xxxix
 Karamanka, 297
 Le Lectier, xlix
 Marie Louise, xlix
 Santa Claus, xlix
Pelargonium Betty Davies, cxxviii
 Dinah exhb., cvi
 Grenadier exhb., cxxv
 Wood Norton Gem exhb., clxxvi
Pelargoniums, scented, xxx
Pentaphis auriculae, 166
Pentapterygium serpens, 184
Pentstemon antirrhinoides, civ
 isophyllus, 520
 procerus Tolmiei exhb., cxxvii
Pereskia, 524
Pernettya mucronata, clxxii
Perowskia atriplicifolia, **A.G.M.** 134,
 388
Pesel, L. F., *see* Spender, R. E. S.,
Pests, Garden: their detection and
 control, 140
 "Pests of Fruits and Hops," by A. M.
 Masee, reviewed, 469
 "Pests of Ornamental Garden Plants,"
 by G. Fox Wilson, reviewed, 517
Petroselinum sativum, eelworm, 337
Pettigrew, W. W., "Municipal Parks:
 Layout, Management and Adminis-
 tration," 518
Petunias on trial at Wisley, 364
Phacelia sericea, 244
Phaius Marthiae, lxxvii
Phaseolus vulgaris, eelworm, 337
Philesia buxifolia, 236, 252, 414, cxlvi
Phlomis fruticosa, 388
 purpurea exhb., cxxviii
Phlox divaricata, 244
 Drummondii, 189
 Laphamii, 244
 maculata, **A.M.** 414, cxlv
 mesoleuca, lxxxv, cxxvii
 pilosa, 244
Photinia villosa exhb., xxxi
Phygелиus capensis, 390
Phyllocactus, 526
Phyllodoce Breweri, 243
 empetriformis, 243
 glanduliflora, 243
Physalis Franchetii nana, cxc
Phytophthora infestans, 180
Picea mariana, 472
 Smithiana, 446
Pieris macrocalyx, 472
 mariana, clxxii
Pimelea ferruginea, lxxxv
Pine, leaf section, 481
 white-barked, *see* Pinus Bungeana
Pinus Bungeana, 443-5
Piptanthus nepalensis, stomata, 482
Pittosporum chinense exhb., xxxi
 tenuifolium gracile exhb., clxxvii
Plagianthus betulinus, 417
Plant and its water supply, 425, 473
 "Plant Diseases of Great Britain: A
 Bibliography," by G. C. Ainsworth,
 reviewed, 421
Plant distribution, xxxiii, clxxv
Plants, cool greenhouse, 181
 fasciated, clx
 food, of the North American Indians,
 471
 Japanese, illustrated, 472
Platanthera bifolia albino, cxxiii
Platyparea pœcilopectera, lxx
Platytheca galioides, 185
Pleione Lagenaria, cxcviii
Plum Achakou, 297
 Black Prince exhb., clx
 Bountiful, 300, 301
 Brandy Gage exhb., clxi
 Chernostew of Kozlow, 297
 Chiver's Cambridge Gage, 300
 Czar, 300, xlix
 Delicious, 296, 300
 Early Black, 297
 Laxton, 300, 301, cxlviii
 Rivers, 299, 300
 Giant Prune, 300
 Gisborne's, 300
 Grand Duke, 299
 Keen of Bosnia, 297
 Late Prolific, cxcii
 Laxton's Chieftain exhb., clxxiii
 Conqueror exhb., clxxiii
 Delightful exhb., clxxiii
 Gage exhb., clxxiii
 Goldfinch exhb., clxxiii
 Reward exhb., clxxiii
 Lindsey Gage, 297
 Manchurian Beauty, 297
 Marjorie's Seedling, 296, 300
 Monarch, 299, 300
 Myrobellia, 384
 Ontario, 297
 Poulkowa, 297

- Plum President**, 300
 Projegatcha, 297
 Purple Pershore, xlix
 Radchenko's yellow, 297
 Red of Winter, 297
 Reine Claud Reform, 297
 Stanleot, 300
 Stint exhb., clix
 Sugar, 300, clxi
 Swan, 300
 Thorn of Dessert, 297
 Sweet, 297
 Ussurian, 297
 Utility, 299, clix
 Victoria, 300, xlix, clxxiii
 Warwickshire Drooper, 300
 Wyedale, xlix
Plumbago capensis, 184, civ, cxxi
 rosea, 187
 Plums, pollination in, clxxiii
 Plusia gamma, xxxvii
 Poa foliosa, 447
 Podophyllum peltatum, 242
 Pogonia ophioglossoides, 246
 Polemoniaceae, Eastern, 520
 Polemoniella in the Eastern States, 520
 Polemonium caeruleum, 520
 in Eastern States, 520
 reptans, 520
 Van-Bruntiae, 520
 Polyanthus Robin Hood exhb., cvi
 Polygala Chamaebuxus, 232
 myrtifolia, 185
 oppositifolia latifolia, 447
 Polygonum baldschuanicum, 447
 cuspidatum nectary, 437
 sachalinense, 439
 sericeum exhb., cx
 Polystachya Sandersoni, 227
 Pontederia cordata, 247
 Potato eelworm, 336, 338, 341, 342
 in its early home, 61, 112, 153, 253
 introduction of, 253
 pots, 68-9, 72-3, 116-7, 156-7
 tuber growth, clxxiii
 Potatos, dried, 68
 of Peru, 160
 S. American, and their breeding
 value, 180
 Potentilla fruticosa mandchurica, 388
 prostrata, 388
 pyrenaica, 388
 Veitchii, 388
 Vilmoriniana, 389
 Poterium obtusatum hydathodes, 440
 Potter, J. M. S., on some new Apples,
 497
 Poupart, W., death of, liii
 "Practical Course in Agricultural
 Chemistry," by F. Knowles, re-
 viewed, 178
 "Practical Plant Breeding," by W. J. C.
 Lawrence, reviewed, 547
 "Present Day Rock Garden," by
 Sampson Clay, reviewed, 465
 Primrose, green, lxxxvii
 Primula Allionii, lxxv
 Viscountess Byng, **A.M.** 223, lxxvii
 Barnardoana, 424
 Primula capitata, 515
 chionantha, xlviii
 chungensis, xlviii
 Cockburniana, 351
 consocia, 424
 denticulata, 231, xxxvi, xlviii
 dictyophylla, 424
 Dubernardiana exhb., xcvi
 Edgeworthii exhb., xc
 eelworm, 338
 elatior, 231
 x Ethel Barker, **A.M.** 269, xc
 fiabellifera, 424
 floribunda, 188
 Florindae, civ
 Forbesii, 188
 Forrestii, 188
 x Forsteri, **A.M.** 269, xc
 glaucescens exhb., xc
 Huana, 424
 hyacinthina, 424
 japonica, **A.G.M.** 231, 416, lxxii
 Juliae, 515
 kewensis, 188
 Kinlough Beauty exhb., cviii
 kisoana exhb., xcvi
 limnoica, 231
 Ludlowii, 424
 malacoides, 188, 350, lii, lxvi
 Fascination, lxxviii
 Melody, lxxviii
 marginata, Peakland Violet, xcvi
 Matsumurai exhb., xcvi
 microdonta, civ
 mistassinica, 244
 Moorcroftiana flavida, 424
 nutans, 350
 obconica, 184, 187
 Palinuri, xxxvi
 planiflora, 548
 Poissonii, 548
 x pubescens exhb., xc
 Shieling exhb., xcvi
 pulverulenta, 231, 515
 Willbrook Seedling exhb., civ
 pusilla fiabellata, 424
 Ravensthorpe exhb., li
 root aphid, 166, 172
 scapigera, 168, 170, 172, liii
 Schneekissen, **A.M.** 132, li
 Sherriffae, 424
 Sieboldii x cortusoides exhb., cvii
 sikkimensis subpinnatifida, 424
 sinensis, 187
 Double Dazzler, 1
 stellata Samuel Ryder exhb., 1
 suffrutescens, 227
 Tigmediana, 424
 verticillata, 188
 viscosa, dark form exhb., xcvi
 Wanda Craddock White, lxxxvii
 Winteri, 171
 Primulas, 424
 "Profit from Fertilizers," by H. V.
 Garner, reviewed, 91
 "Profitable Culture of Vegetables," by
 Thomas Smith, reviewed, 328
 Prostanthera rotundifolia, 185, 447,
 xlvi

- Prostanthera Sieberi**, xlviii, lxxiii
Prunus Amygdalus Pollardii, xxxvi
 Asor, **A.M.** 324, lxxxix, cvii
 Avium plena, xlviii
 campanulata, 97, lxxxix
 cerasifera, xxxvi
 Pissartii, 99
 Conradinae, xxxvi
 dasycarpa exhb., lxxxix
 Davidiana, 349
 incisa, xlviii
 × **sachalinensis exhb.**, xcv
 kansuensis exhb., liii
 Maackii, 351
 Padus, lxxii
 Persica Cambridge Carmine, **A.M.** 269, xciv
 prostrata discolor exhb., cxii
 Puddum tibetica, 351
 Sargentii, 238, xlviii
 serrulata Kanzan, **F.C.C.** 324, cvi
 Taoyome exhb., xcv
 subhirtella autumnalis, 234
 pendula, xlviii
 Totsuka, **P.C.** lxxxix
 tomentosa, xxxvi
Psidium Cattleianum, 545
Pterocarpus rotundifolius, 140
Puccinia Antirrhini, 214, 217
Puddle, F. C., on hybrid **Rhododendrons**, 393
Pulmonaria angustifolia, xlviii
Pulsatilla vulgaris, Budapest form exhb., lxxxix
 double-flowered exhb., xcv
Pycnostachys Dawei, 187
Pyraecantha angustifolia exhb., lxxvi
 atalantioides forma aurea, **A.M.** 88, xxxi
 coccinea, 389
 Lalandei, 389
 Rogersiana flava, 389
 × **Watereri**, xciv
Pyrethrum Jubilee Gem, cxxiv
Pyrola bracteata, 247
 uniflora, 247
Pyrolirion, 195, 207
- Quercus Cerris laciniata**, xxx
 coccinea, clviii
 splendens, 238, clxxii
 incana, 97
 Robur stomata, 482
Quince Smyrna exhb., xxxix
- Ramondia Heldreichii**, 250, 252
 Myconi, 249
 alba, 249
 rosea, 249
 Nataliae, 250
 serbica, 249, 250
 Nathaliae, 249
Ranunculus parviflorus nectary, 437
Ranzania japonica, **A.M.** 269, xcvi
Raphiolepis, 236
 indica, 231
 umbellata, 231
- Raspberry Allenberry**, cxliv
 Bountiful, 302
 Brocket Hall, 301, cxliv
 Dreadnought, 297
 Duke of Cornwall, 296, 301, cxliv
 Epicure, 302, cxliv
 Lloyd George, 301
 Matchless, 302, 303
 Mayfair, 296, 301
 Newburgh, 296, cxlviii
 Norfolk Giant, 301, 303
 Pyne's Royal, 301
 Red Cross, 301, 303, cxliv
 Reigate, 301
 Reward, 302, 303, cxliv
 Taylor, 296, cxlviii
 Viking, 297
Rawes, A. N., *see* Keeble, Sir F. W.
Rebutia, 526
 "Recent Advances in Cytology," by C. D. Darlington, reviewed, 468
Red Clove, eelworm, 338
Reinwardtia tetragyna, 187
 trigyna, 187
Remusatia vivipara, xcii
Renanthera Imschootiana, Cardinal, **A.M.** 324, cx
Reseda odorata, 189
Rhaphitamnus cyanocarpus, 230
Rheum, the genus, 520
Rhodochiton volubile, 184
Rhododendron Abbot exhb., lxxviii
 albiflorum, 247
 Albrechtii, 97
 Alice × **Griffithianum exhb.**, cviii
 Androcles exhb., lxxxvii
 arboresum, 94, 228
 Bodnant Pink exhb., xcvi
 hybrids, 96
 Kingianum, 228
 artosquameum exhb., cviii
 Aucklandii, 94
 Augustinii, 96, 351, 395
 auriculatum, 351
 Bluebird, **P.C.** 269, xcvi
 Bo-peep, **A.M.** 223, lxxxvii
 boninense, 472
 Britannia, **F.C.C.** 324, cix
 bullatum, **F.C.C.** 223, 350, lxxvii, cxxvi
 calophytum, 349, 544
 campanulatum, 395, xcvi
 campylocarpum exhb., cviii
 canadense, 247
 Cardinal, **F.C.C.** 270, xc
 × **cerasinum exhb.**, cxii
 chrysanthum exhb., xcvi
 chryseum, 396
 cinnabarinum blandfordiaeflorum, cxliii
 Cinnandrum exhb., cxxvi
 Tangerine, **A.M.** 414, cxxvii
 Clara Brown, **A.M.** cxi
 commodum, **A.M.** 270, xc
 × **Cornish Cream exhb.**, cviii
 × **Coronation exhb.**, xc, cxii
 × **Cowslip**, **A.M.** 373
 crassum, 98
 chrysodoron exhb., lxxviii

Rhododendron crinigerum, 228
Daphne, *Eithne*, *A.M.* 175, lxvii
decorum, 349
Decsoul, *A.M.* 373, cxi
Delavayi, 350
dendricola exhb., cviii
dichroanthum, 397
dilatatum, 548
Dione exhb., lxviii
discolor, 350
decorum exhb., cxii
leaf-hopper on, 212
× Diva, *A.M.* 373, cxi
Dr. A. Blok, *A.M.* cxi
Edgeworthii, 183
Elliotii, *F.C.C.* 270, xcvi
Elsbeth, *A.M.* 324, cv
eriogynum, 98
Ethel exhb., xc
exquisitum, *A.M.* 373, cxi
Fabia High Beeches exhb., cxii
Fargesii, 350
Fire Ball exhb., lxxvii
Firetail, *F.C.C.* 373, cxi
formosum, 183, cxii
Fortunei hybrid exhb., cxxvi
fragrantissimum, 183
Fulgarb, *A.M.* 132, l
grande exhb., li
Grierdal exhb., xcvi
Grierosplendour exhb., cxii
Griersonianum, 397, 544
Griffithianum, 94
haematodes, 397
Handel, *A.M.* 324, cv
hemidartum exhb., xc
Hodgsonii, 95
hybrid, precocious flowering, 544
impeditum, 396
indicum, 185
javanicum, 94
× kewense seedling exhb., cxii
Lady Alice Stanley, 183
Berry, *A.M.* 374, cxi
leucaspis exhb., lxxxvii
Lindleyi, *F.C.C.* 324, cviii
Little Ben, *F.C.C.* 224, lxxxvii
Loderi, 96, 233
Lucy Locket exhb., cviii
lutescens, 349, xxxvi
× Harrovianum, 97
Macabeanum, *A.M.* 224, lxxxvii
Maddenii calophyllum exhb., cxii
× Margot exhb., cxii
Marinus Koster, *A.M.* 325, cix
May Day exhb., cviii
megacalyx, *A.M.* 415, cxxvi
Mrs. Charles Brown, *A.M.* cxi
Morii, 95
moupinense, 349, 396, xxxvi
pink form, *A.M.* 175, lxvii
mulinense, 396
neriiflorum, lxxviii
nilagiricum, 228
niphargum, 520
nobile exhb., lxxxvii
obtusum, 186
Kaemperii, 189
orbiculare, 97, 397

Rhododendron oreodoxa, *A.M.* 270, xc
Penelope exhb., lxxvii
pentaphyllum, 97
ponticum, 229
× praecox, xxxvi
prostratum × impeditum, 396
prunifolium exhb., cviii
racemosum, 350
Racil exhb., xcvi
radicans, 396, 397
Radium exhb., cxii
Redwing, *F.C.C.* 270, xc
repens, 397, lxxviii
Romany Chal, *F.C.C.* 415, cxxvi
reticulatum, 548
rhombicum, 548
St. Probus, 95
saluenense × hippophaeoides, 396
Sarita Loder, *Dencombe* exhb., cxii
scabrifolium exhb., lxviii
scopulorum, *A.M.* 224, lxxvii
Selig, *F.C.C.* 374, cxi
Shepherd's Delight exhb., cxii
sinogrande, 96, 101
Sir Charles Lemon exhb., xcvi
Sir Frederick Moore, *A.M.* 374, cxi
Standishii, 233
stenaulon, *A.M.* 270, xc
sulfureum exhb., lxxxvii
Surprise exhb., xcvi
Susan, 95
sutchuenense, 350
Titness Beauty exhb., cxii
tosaense, 98, 105
Touchstone, *A.M.* 374, cxi
tristis, 332
uvarifolium, 520
Wardii × Williamsianum, *A.M.* cviii
Weyrichii, 96, 548
White Ensign exhb., cxii
Glory, *A.M.* 271, xcvi
Lady exhb., cviii
Swan, *A.M.* 325, cix
Valentinianum exhb., lxxxvii
Wattii, 228
zeylanicum, 228
Rhododendrons, hybrid, 393, lxxviii
leaf-hopper, 210
of Ceylon, 228
Manipur, 228
South India, 228
Rhodohypoxis platypetala, Beamish
White exhb., cxii
Rhopalostylis sapida, 447
Rhubarb seedlings, cxii
Rhus Cotinus purpureus, Notcutt's
var., *A.M.* cxlix
Richard Milles's New Kitchen Garden,
501
Roberts, W., on Robert Milles's New
Kitchen Garden, 501
Robinia hispida, 386
Kelseyi, 386, cxxv
Rochea coccinea, civ
Roettlera Forrestii, 252
Romneya Coulteri, 237, 543, civ
Romulea Engleri exhb., lxxiv
Rondeletia cordata exhb., li
Root-knot eelworm, 336-46

- Rooting of cuttings, acceleration of, lxxiv
Rosa Hugonis, lxxii
 chinensis semperflorens, clxxiii
 damascena bicolor, 193.
 versicolor, 192
 eelworm attk., 338
 gallica versicolor, 192, 193
 mollis, 193
 Moyesii Geranium exhb., cxxv
 Rubus exhb., cxxv
 setipoda exhb., clxxiv
 xanthina, 349
Rose American Beauty, 191
 Black Tuscany, 194
 Blairii No. 2, 193
 Cramoisie, 191
 Superieure, 191
 Dainty Maid, *A.M.* 454, clix
 Dame Edith Helen, 510
 flowering precociously, clxxiii
 Garden at Trewithen, 96, 97
 Girona exhb., cxlix
 Gloire de Dijon, 378
 La France, 193
 Lady Nutting exhb., cxlix
 Lamarque, 193
 Leaf-hopper, 211
 Maman Cochet, 193
 Mermaid at Wisley, 84, civ
 Mrs. Sam McGredy, 510
 Orange Triumph, *A.M.* 415, cxlviii
 Papa Gontier, 193
 Paul P  ret, 193
 Peon exhb., cix
 Poulsen's Yellow, *A.M.* 415, cxlviii
 Mundi, 191, 193
 Royalty exhb., cxxv
 Sam McGredy (H.T.), *A.M.* 542, cxc
 Souvenir de la Malmaison, 193
 Walter Bentley, *A.M.* 510, cxliv, clxxiv
 York and Lancaster, 191, 193, 420
Rosenheim, P., on the earthy Scree, 419
Roses, competition for Clay Cup, lxxxiv, cii
 Old Garden, 190
 "Rosecraft: A Guide to Rose Growing," by Harry A. Day, reviewed, 328
Rosmarinus officinalis white var. exhb., xciv
Rowntree, Lester, "Hardy Californians," 136
Rubus arcticus, 247
 nitoides, *A.M.* clxi
 thyrsiger, clxxiii
Rudbeckia Newmanii, 390
Ruellia macrantha, 187
 "Rural Roundabout," by H. Clarke, reviewed, 90
Russell, Sir E. John, "Soil Conditions and Plant Growth," 272
Sainfoin eelworm, 338
Salaman, Dr. R. N., on Potato in its early home, 61, 112, 153, 253
Salisbury, Prof. E. J., on plant and its water supply, 425, 473
Salix herbacea stomata, 482
Salvia bicolor exhb., cxlv
 Bulleyana exhb., cxxv
 splendens, 188
 superba, 391, civ
 White Rocket, cix
Sambucus nigra, eelworm, 338
Samuelson, M. K., "Sussex Recipe Book," 546
Sanderara \times Alpha, *P.C.* cxlv
Sandersonia aurantiaca exhb., cxxv
Sanguinaria canadensis, 241
 flore pleno, *A.M.* 241, 271, xcvi
Santolina Chamaecyparissus, 389
Saponaria lutea exhb., cxii
Sarmienta repens, 252
Sarracenia purpurea, 247
Saurauia napaulensis, 520
 subspinosa, 520
Saxifraga catalaunica exhb., cxii
 cortusaefolia rosea exhb., xxxi
 \times *croydonensis exhb.*, cxxvii
 \times *Crystalie exhb.*, lxxxvii
 Federici-Augusti exhb., xcvi
 Fortunei, *A.M.* 542, cxcviii
 Iris Prichard exhb., liii
 maderensis exhb., xcvi
 scardica exhb., lxxiv
 rosea exhb., lxxxvii, lxxxviii
 squarrosa, *A.M.* 415, cxlvi
 Stuartii lutea, lxxxvii
 \times *Sundermannii purpurea*, *A.M.* 175, lxxiv
 virginiensis, 243
Schima argentea, 96
 khasiana, 96
Schizandra rubrifolia exhb., cx
Schizocodon ilicifolius albus, xcvi
Schizophragma integrifolia, 96
Schomburgkia Thomsoniana, clxi
School of Horticulture, vi
 "Scientific Principles of Plant Protection," by H. Martin, reviewed, 91
 "Scientific Study of the Soil," by N. M. Comber, reviewed, 136
Scilla Tubergeniana, *A.M.* 175, xli, liii
Scree, earthy, 419
Scrophulariaceae, North American, 180
Scutellaria costaricana, 187
Sealy, J. R., on *Camellia* in cultivation, 352
 on *Zephyranthes*, *Pyrolirion*, *Habranthus* and *Hippeastrum*, 195
 "Second Book of South African Flowers," by H. S. M. Bolus, D. Barclay and E. J. Steer, reviewed, 225
Sedum boannense, 472
 fastigiatum exhb., cxxix
 Palmeri exhb., cviii
 praealtum exhb., xcvi
 Praegerianum exhb., cxxix
 sarmentosum variegatum exhb., cxii
 spectabile, 390
 atropurpureum, 390
Seed beetle, lxvi
Sempervivum, 525

- Sempervivum Allionii*, 279, cxlvi
 altum, 282
arachnoideum, 278, 280, 281-3, 524
 glabrescens, 281
 Stansfieldii, 282, cxii
 tomentosum, 281
arenarium, 279
armenum, 283
atlanticum, 280, 283
banaticum, 424
 × *ruthenicum*, 424
brunneifolium, 424
 × *calcaratum*, 280-1, 285
calcareum, 280
 Mrs. Giuseppi, 280
cantabricum, 280, 283
caucasicum, 280
ciliolum, 283, 284
 Borisii, 284
Degenianum, 424
dolomiticum, 280
erythraeum, 280, 282
 × *Gamma*, 280, 282
glaucum, 281, 283
globiferum, 279
grandiflorum, 283
Heuffelii, 279, 285
 glabrum, 279
hirsutum, 279
hirtum, 279, 280
 glabrescens dentata, 424
Kindingeri, 283, 284
Kosaninii, 280, 282
leucanthum, 283, 284
macedonicum, 280, 281-3
Michaelis-Borsii, 288
montanum, 280, 282, 283, 285
 Burnatii, 282, 283
 stiriacum, 282
marmoreum, 280
 × *ornatum*, 280, 281, cxlvi
patens, 279
Pittonii, 283, 284
pumilum, 280, 282
Reginae-Amaliae, 279
rubrifolium, 280
ruthenicum, 283
Schlehanii, 228, 280, 281, 424
 dimorphum, 424
 rubrifolium, 281
 tokajense, 424
soboliferum, 279
spinifolium, clx
tectorum, 228, 277, 280-4, 424
 alpinum, 280
 glaucum, 280
 versicolor, 284
 Wulfenii, 283
Sempervivums, 277
Senecio, 528
 articulatus, 529
 glastifolius, P.C. cxxv
 Greyi, 135
 Hectori, 417
 laxifolius, A.G.M. 134, 135, civ
 rotundifolius, 448
 stapeliiformis, 529
 vulgaris, eelworm, 337
Sequoia gigantea, 446
Serapias cordigera exhb., cviii
Sewell Medal Competitions, xlvii, lxxi, lxxxii, cxxxix
Shortia galacifolia at Wisley, 85, xxxvi, xlviii
 Show, Amateurs' Flower, iii
 American Peony Society, lxxii
 Autumn, iv, cxvii, cxxxvii, clxxxvii
 Chelsea, 325, iii, xxxv, xlv, lxix, ci, cxii, cxxii, clxx
 Daffodil, ii, xlv, lxxxi, xc, xcii
 Early Market Produce, iii, xlv, xci
 Fruit and Vegetable, cxxxvii, cxxxviii, cliii
 Shrubs in a Dorset Garden, 229
Silene Elisabethae, 515
 maritima, epidermis, 436
 Sloane, B. L., see White, A.
 "Small Alpine Garden," by H. P. Leschallas, reviewed, 375
Smilacina racemosa, 245
 stellata, 245
 trifolia, 245
 Smith, Thomas, "Profitable Culture of Vegetables," 328
 "Soil Conditions and Plant Growth," by Sir E. John Russell, reviewed, 272
 Soil, manganese in, xxxvii, li
Solanum Wendlandii, civ, cxxi
Soldanella alpina, A.M. 224, lxxxvii
 pusilla, A.M. 224, lxxxvii
Solidago bicolor, 248
 canadensis, 248
 Virgaurea nana, 390
Solidaster hybridus, 519
 luteus, 519
Sollya Drummondii exhb., cxxv
 heterophylla, 183
 Solomon's Seal stomata, 482
Sophora macrocarpa exhb., xcv
 tetraptera, 236
 grandiflora, 231
 viciifolia, 351
Sophrolaeliocattleya Magnet, 542
 Rosamund, Westonbirt var., A.M. 542, cxci
Sorbus Aria lutescens, 386
 Aucuparia, 386
 fructu luteo, 386
 majestica, 386
 Prattii, 140
 Spade, Wooden, Nazca, r60
Sparmannia africana, 185, 545
Spartium junceum, 236, civ
Spathodea campanulata, 515
Spathoglottis plicata, cxi
 Speir, Lt.-Col. G., on Apple harvest-
 ing, 83
 Spencer, Stanley J., "Dahlias," 517
 Spender, R. E. S., and Pesel, L. F.,
 "Iris Culture for Amateurs," 466
Sphaerolaelia pannosa, 108
 Spines, 522
Spiraea Thunbergii, 384
 tomentosa, 244
 "Spring Frosts," reviewed, 375

- Squirrels, grey, cxi
 Stachys lanata, 485
 Stapelia, 527
 Decaisneana, 140
 jucunda, 140
 "Stapeliae, The," by A. White and
 B. L. Sloane, reviewed, 272
 Staphylea holocarpa, 351
 Statice brassicaefolium grandiflorum,
 391
 Collier's Pink, cxc
 ornata, civ
 rosea, civ
 Stellaria Holostea, 439
 media, eelworm, 337
 Steer, E. J., see Bolus, H. S. M.
 Stern, F. C., on the Flora of China :
 early investigations, 347
 Stewart, W., on Nerium odorum, 513
 Stewartia Malacodendron, 232
 pentagyna grandiflora, 232
 Pseudo-Camellia, 232
 sinensis, 232
 Stiffia chrysantha, clix
 Stilbocarpa Lyallii, 447, 448
 polaris, 447
 Stock, leaf-spot of, 228
 Stokesia cyanea, 391
 Stranvaesia Davidiana, 349
 Strawberry Cambridge Early, cxxvii
 Catskill, 296
 Clark, 301
 Clermont, 296
 Corvallis, 296, 301
 Culver, 296
 Ettersberg, 121, 301
 Marshall, 301
 Red Heart, 301
 Royal Sovereign, 300
 The Seventeenth, 297
 Western Queen, 296, 300
 Strelitzia Reginae, lxxii
 fruit, lxvi
 Streptopus roseus, 245
 Streptosolen Jamesonii, 184
 Styra japonica, 230
 Obassia, 231, 236
 Succulents, 528, 529
 cultivation, 544
 "Sussex Recipe Book," by M. K.
 Samuelson, reviewed, 546
 Sutura breviflora, cxci
 Sutherlandia frutescens, 189
 Sutton, Messrs., "Lawns," 466
 Symplocarpus foetidus, 472
 Syringa microphylla, A.M. 543, cxci
 oblata exhb., lxxvi
 villosa, 347
 Syritta pipiens, clx

 Tacilla, 161
 Tagetes erecta, Golden Crown, *F.C.C.
 542, 543
 Tamarix hispida, 389
 Tavaresia, 527
 Taylor, H. V., "The Apples of Eng-
 land," 89

 Telopea truncata, 230, 233, cx
 Testudinaria Elephantipes, 529
 Tetracentron sinensis, 351
 Tetraneuris acaulis exhb., clxxv
 Teucrium Ackermannii exhb., cxlvi
 Thalictrum dipterocarpum Hewitt's
 Double, A.M. 455, clxi
 Thea, 354
 Bohea, 356
 cuspidata, 356, 357
 Forrestii, 363
 maliflora, 357-8
 flore pleno, 357
 sinensis, 353, 355
 speciosa, 362-5
 viridis, 356
 Theropogon pallidus exhb., cxxv
 Thunbergia alata, 184, 189
 Gibsonii, 189
 natalensis, civ
 Thuya occidentalis, 384
 Thymus membranaceus, civ, cxlvi
 sp., P.C. clxxv
 Tiarella cridifolia, 241
 Tibouchina macrantha, 184
 semidecandra, clviii, clxxii
 Tomato eelworm, 338
 Trachelium caeruleum, 188
 Trachelospermum jasminoides, 184, cx
 Trachymene caerulea, 189
 Tradescantia alba, cxxiv
 azurea, cxxiv
 J. C. Weguelin, cxxiv
 Leonora, cxxiv
 Lilac Time, cxxiv
 Osprey, cxlix
 Paulinae, cxxiv
 Trees, Ornamental : care of, 141
 and Shrubs in Glamorgan, 180
 Trewithen, Cornwall, 93, 96, 97, 100-
 101, 104, 105, 108-9
 Trials at Wisley, 24, v, vii
 Trichospermum Weimannianum, 97
 Tricuspidaria dependens cuttings,
 acceleration of rooting, lxxv
 laceolata, 96, 230, 233, cxlix
 Tricyrtis formosana exhb., clxxxvii
 Trillium cernuum, 244
 erectum, 244
 grandiflorum, 244
 nivale, 244
 ovatum, 244
 recurvatum, 244
 undulatum, 244
 Triptilion spinosum, civ
 Tropaeolum speciosum, cxxi
 Truffaut, M. Georges, on science pro-
 gress applied to Horticulture, 100
 Tulgey Wood, Gardens at, 232, 233,
 236-7, 240, 241
 Tulip Advance, 79
 City of Haarlem, 80
 Clara Butt, 79
 Couleur Cardinal, 80
 Keiserskroon, 80
 Mayflower, 79
 Millet, 79
 Mozart, 80
 Velvet King, 79

- Tulipa stellata* exhb., lxxx
Tulips from Crete, cv
 Garden, classification of, 78
 Turrill, Dr. W. B., on the genus
Fritillaria in the Near East, 329
Typhlocyba rosae, 211
quercus, 211
- Umbilicus spinosus*, 525
Uvularia grandiflora, 242
perfoliata, 242
- Vaccinium fragile*, P.C. cxxviii
Nummularia exhb., xcvi
Vanda × *Charlesworthii*, lxxxix
coerulea, Queen Elizabeth, F.C.C.
 cxcviii
Lawrenceana, cxcviii
 × *Rothschildiana*, Alpha, F.C.C.
 374, cx
Sanderiana, cxc
Olympia, A.M. 543, cxc
 Vegetative propagation of tropical
 fruits, 424
 Vegetables and Fruit in Diet, 286
Veltheimia viridifolia, 187
Veratrum viride, 244
Verbascum Myconi, 249, 250
Verbena bonariensis, A.M. 415, clx
chamaedryfolia, civ, cxxi
Veronica gentianoides variegata, 391
Hulkeana, xlviii, lxxiii
incana rosea exhb., clx
pyrolaeflora exhb., cxii
Teucrium Bastardii exhb., cxxvii
virginica, 180
Wendy, cxlix
Veronicastrum virginicum, 180
Vexillabium fissum, 472
Viburnum betulifolium, 98, 108
flavescens, cxciv
foetidum, cxciv
fragrans, 347
nanum, A.M. 133, li
grandiflorum, A.M. 133, l
 effect of callus-paring upon root
 production, 139
Henryi, 351
Opulus, 439
rhytidophyllum, 351
theiferum, xxxviii, cxcviii
venosum Canbyi exhb., xxxi
utile, 351
Victoria Medal of Honour, 57, ix
Viola blanda, 241
canadensis, 241
Coronation exhb., cx
Dörfleri, P.C. cxii
Grisebachiana, A.M. 271, xcvi
Herzogii, A.M. 271, xcvi
Iden Gem, cvi
lanceolata, 241
odorata, colour varieties, lxxxviii
palustris, 241
papilionacea, 241
- Viola pedata*, 241, cviii
pubescens, 241
rotundifolia, 241
sagittata, 241
striata, 241
Viscum minimum, 471
Vitis Henryana, 351
heterophylla, 238
inconstans, 453
Vuykstekeara Josephine Kirkpatrick,
 A.M. 374, cx
Memoria H. H. Smith, A.M. 455,
 clxxv
Rajah, Eclipse, F.C.C. 175, lxxviii
- Waksman, S. A., "Humus: Origin,
 Chemical Composition, and Import-
 ance in Nature," 274
 Water conduction, 479
Watsonia Galpinii, clxii
 sp., P.C. cxlv
Weigela Avalanche, 385
Eva Rathke, 385
 Seduction, 385
 Wells, A. L., "Aquariums and Fish
 Ponds," 178
 Wells, B., on Hardy Hybrid Korean
Chrysanthemums, 220
 Wheelwright, E. G., "Greenhouse
 Culture for Amateurs," 225
 White, A., and Sloane, B. L., "The
Stapelliae," 272
 White Fly Parasite, vi, lxxii, lxxxv,
 ciii, cxx
 Wilder, Louise Beebe, "Adventures
 with Hardy Bulbs," 467
 Williams, P. D. Memorial Medal, ii,
 324, 327
 Wilson, G. Fox, on Leaf-hopper on
Rhododendrons, 210
 "Pests of Ornamental Garden
 Plants," 517
 Wisley, border of annuals, 88, 372
 Commercial Fruit Trials, 296
 donations of plants, etc., xliii,
 xcvi, cli
 Gardens, 19, 85, 544, iv, xxix,
 xxxvi, xlviii, lxxii, lxxxv, civ,
 cxxi, cxli, clvii, clxxii, clxxxvi
 Heath Garden, 213, 543
 interesting plants in glasshouses,
 515, 544
 Laboratory, investigations at, vi
 contributions from, 210, 214,
 336
 Practical Demonstrations at, vi,
 xxviii, xxxv, xlvii, lxxxiv, ciii,
 cxix, clvi, clxix, clxxxv
 Wild Garden, 89
Wistaria chinensis, 347, 348
floribunda fl. pl. exhb., cx
Witsenia corymbosa exhb., clxxv
 "Woodland Garden," by A. T. John-
 son, reviewed, 273
Woodwardia areolata, 244
 Woolley, R. N. Giffard, see Miles
 Hadfield

- Woolman, J., on Notes on New Yucca filamentosa, 236
 Chrysanthemums, 128
 Woolly aphid control, 424
- Xanthium strumarium 477
 Xanthoceras sorbifolia, 349
 Xerophytes, 523
- Yellow Leaf-hoppers, 211
 "Your Flower Garden," by H. A. Day,
 reviewed, 136
- Zaluzianskya roselioides exhb., xcvi
 Zantedeschia africana, 187
 Elliottiana, 187
 ethiopica White Giant, lxxviii
 Pentlandii, 187
 Rehmannii, 187
 Zephyranthes, 195, 206

ERRATA AND CORRIGENDA.

- P. 70, line 46, for Chinese, read Chimu.
 P. 139, lines 48 and 50, for *neilgherense*, read *neilgherrense*.
 P. 232, fig. 67, and following figs., for TUGLEY, read TULGEY.
 P. 236, fig. 69, for ANOPTERUS GLANDULOSA, read ANOPTERUS GLANDULOSUS.
 P. 350, line 23, for *pardanthinum*, read *pardanthina*.
 P. 385, line 46, for *Middendorffiana*, read *Middendorffiana*.
 P. 388, fig. 102, for HAETNENSIS, read AETHNENSIS.
 P. 391, line 34, for *Thompsonii*, read *Thomsonii*.
 P. 396, fig. 104, for MONPINENSE, read MOUPINENSE.
 P. 399, footnote, for fourteenth, read fourth.
 P. 417, line 15, for *exorticata*, read *excorticata*.
 P. 422, line 25, for Country Life, read Martin Hopkinson.
 P. xxxvii, line 23, for *Arauja*, read *Araujia*.
 P. lxvi, line 8, for *regina*, read *reginae*.
 P. lxxvii, line 1, after 'Marie Antoinette,' insert Jewel.
 P. cx, line 65, for 'Profession,' read 'Profusion.'
 P. cxlvi, line 28, for Bootham, read Boothman.

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